ROLE OF ULTRASONOGRAPHY IN THE DIAGNOSIS OF ABDOMINAL MASSES

THESIS

FOR

MASTER OF SURGERY

(GENERAL SURGERY)

BUNDELKHAND UNIVERSITY
JHANSI (U. P.)

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C O N T E N T S

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CERTIFICATE

This is to certify that the work entitled " ROLE OF ULTRASONOGRAPHY IN DIAGNOSIS OF ABDOMINAL MASSES." which is being submitted as THESIS for M.S.(GENERAL SURGERY) examination, 1992 of Bundelkhand University, Jhansi by Dr. SAGHIR AHMAD KHAN has been carried out under my direct guidance and supervision. His results and observations have been checked and verified by me from time to time.

He has put in the necessary stay in the department of surgery as per university regulations.

Date : 31st July, 1991

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A C K N O W L E D G E M E N T

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S. A. Khan

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I N T R O D U C T I O N

Abdominal cavity is a confined space in which almost whole Gastro intestinal tract and various important organs of the body are lodged.

Various diseases of the gastro intestinal tract and other organs have clinical presentation with varied symptoms and signs.

Several diagnostic methods have been evolved from time to time to diagnose these diseases and growths without resorting to the final diagnosis at laparotomy. Though there methods give an indication towards a probable diagnosis, final verdict is given by laparotomy alone.

Various methods employed to diagnose intra-abdominal masses are :

1. Non-Invasive :

    a. Clinical examination

    b. Ultrasonography

    c. Computerised Axial tomography

    d. Radioactive isotopes.

2. Invasive :

    - Fine needle aspiration cytology

    - Tru cut needle aspiration biopsy.

ULTRASONOGRAPHY :

It was introduced in medicine in early 1950's and since then it developed slowly and only became a practical imaging tool in the late 1960's, mainly in

cardiology and obstetrics. Its use in Radiology remained limited until the introduction of gray scale displays in early 1970's.

The last ten years (1975-1985) have seen an accelerated development with image, quality improving dramatically year by year at a rate comparable to that of CT scanning and magnetic resonance imaging. During these ten years there has been several generations of new equipment and the development of new scanning techniques.

Early gray scale imaging on static B-scanners used analogue signal processing and image storage and for the first time allowed partial manipulation of the enormous range of information available in ultrasound signal. This technology was gradually replaced by digital means of processing and storage which, although initially inferior, improved the reliability of the systems and made them easier to use.

<u>REAL TIME IMAGING</u> :

Real-time imaging became available in the late 1970's. Within five years the image quality was equal to that of old scanners and now far surpasses it. The ability to study structures in movement and to track the image plane rapidly through any orientation, greatly improved recognition of ultrasound anatomy and led to appreciation of finer detail. This freedom was achieved at a price. The field of view was reduced from a complete Axial or an extended

longitudinal section to a much smaller, rectangular or trapezoidal window governed by the width of the contact between transducer face and skin surface.

In the last five years, there have been two major lines of development in the real time systems. Mechanical scanning heads have been modified and refined for special purposes. Small part scanning is performed with small, very high frequency transducers in a housing in-corporating a fluid " stand off " for optimum focusing at a depth 2-3 cm. below the skin surface. Brain biopsy can now be performed with guidance from a transducer designed to fit into a standard width burr hole. Similar instruments are widely used for transfontanel scanning in neonates, and have almost completely displaced C T scanning in the first year of life.

Duplex scanning of the carotid arteries and of peripheral vessels combines 10 MHz imaging with Doppler flow mapping, larger aperture transducers with extreemly long focal lengths have been devised for use in gynaecology and for imaging deep structures within the body.

Very small transducers have been constructed within specially designed endoprobes to invade body cavities and to bring the much higher resolution of the small part-scanner of internal organs. There is now a very wide range of endoprobe instruments available. Mechanical and electronic transrectal scanners give excellent images of the prostate, bladder base, uterus and cervix. Probes have been made small enough to be inserted via a urethroscope to study

bladder tumors at cystoscopy. These have even been employed within the uterine cavity for staging of endometrial cancer. Modified upper gastro intestinal endoscopes with mechanical or electronic transducers at the tip can study the contiguous, solid mediastinum , the heart from the optimal viewing point of the cardiac base, the walls of upper gastrointestinal tract and all the contiguous organs which can be accessed from within a fluid filled stomach or duodenum.

Small, high-frequency probes can be introduced into the abdominal cavity either at laparotomy or laproscopy. These are mainly used to plan major hepatic and pancreatic resections and biliary reconstructions but are also used to detect calculi in the renal and biliary tracts. Similar probes can produce excellent images of the brain to guide biopsy and surgical procedures after craniotomy .

This specialization has led to an enormous range of instruments, each optimized for imaging a particular organ or for solving a particular radiological or surgical problem.

Conventional instruments have now evolved to the point where the full power of the computer is used in all stages for signal acquisition, through image processing and storage, to display, electronic control of large array of small transducer elements permits improvements of the image that cannot be achieved with single crystals.

Manipulation of individual elements across the face of array generates beams at variable angles, to the line of sight and hence steers the beam. On simple linear array systems this is achieved by stepping an active group of 8-32 elements across the face of a long array (400-500 individual crystals) but on phased array systems the beam can be steered through a 90° angle. Varying the width of the active array enables the aperture to be decreased for points in the near field and increased for points in the far field. Resolution is a function of aperture as well as frequency and by continually increasing the transducer diameter with depth of target, resolution then becomes independent of depth. Complex signal processing can also improve the sensitivity of an array to targets along the scan line relative to those spurious echoes coming from other structures. This reduces artefact and increases signal-to-noise ratios.

PHYSICS:

Ultrasound is a form of energy consisting of mechanical vibrations occurring at frequencies above those that can be appreciated by the human ear. The lowest frequency in the ultrasonic range is generally taken to be 20 KHz but most ultrasound used for diagnostic purposes is within the range of 1 to 15 MHz. Ultrasounds has the property of being able to pass at a constant speed through the soft tissues of the body and it does this in the form of a wave. Its speed in the different soft tissues of the body is for practical purposes about the same (1540 mts per second).

into heat. For any particular frequency, the rate of absorption is constant and within the diagnostic range, The higher frequency of the ultrasound used the greater the rate of abdorption. Therefore, the lower the frequency of the generated ultrasound, the greater is its penetrating power within the body. This is the opposite to the x-rays. when an ultrasonic, wave reaches an interface or boundary between two structures of different characterstics impedance. (The characterstic impedance of a medium is the product of the density of the medium and the velocity of ultrasound through it.) part of the wave will pass through the interface and part will be reflected. The reflected portion obeys the laws of light reflection i.e. the angle of incidence is equal to angle of reflection. It is only if the incident beam is at right angles to the plane of the interface that a portion will be reflected back to the transducer and therefore an echo recorded on the oscilloscope.

The piezo electric effect is used to generate and detect ultrasound. The piezo electric material, called a transducer, Most frequently used in synthetic, ceramic, lead Zirconate Titanate. If a disc of this material is electrically excited by means of an alternating voltage applied to it, the disc will vibrate and radiate ultrasound energy in the form of a wave in all directions from its

surface,for diagnostic purposes it is arranged that a non-foccused narrow beam issues from the front surface of the transducer. The echoes received back produce a reverse piezo-electric effect in the transducer as a result of which voltages are generated on its surface. These voltages are then amplified and processed to produce a signal on a cathode-ray oscilloscope.

PULSE ECHO TECHNIQUE :

For most diagnostic purpose ultrasound is generated in pulses of very short duration with a repetition rate of between 150 to 1000 pulses per second. The same transducer which is used to generate the ultrasound is also used to receive back the echoes during its resting phases. This is known as pluse echo-technique.

DOPPLER EFFECT :

When ultrasound is relfected from a stationary interface the frequency of the reflected wave is the same as the frequency of the transmitted wave. However, if the reflecting interface is moving, the frequency of the reflected wave will differ from that of the transmitted wave and this phenomenon is known as Doppler effect. The returning signals can be applied to activate a loud speaker or processed by a frequency spectrum analyser.

THE ULTRASOUND IMAGE :

The ultrasound image consists of a section through the tissues which is made up of a number of

individual acoustic lines each of these represents the simple transmission of a pulse of acoustic energy along the given line of sight (The ultrasound beam). This line of sight is then scanned across the tissues to generate a two-dimentional image. Each point along with the acoustic line on the displayed image shows the energy reflected back to the transducer from the tissue at this point. After compensation for tissue attenuation, this is termed echogenicity. The fundamental physics governing echogenicity is complex and not completly understood.

Acoustic energy is reflected at any discontinuity of acoustic impedance within the tissue. The proportion of energy reflected back at any target depends on the geometry of target and the degree of impedance mismatch. The process is analogous to radar. Gas and bone show marked impedance mismatch and hence total reflection occurs at the interface resulting in a very large echo, and complete absence of information from beyond that point. In soft tissues the discontinuities are produced by the connective tissue microskelton that binds the tissues together.

A section through a parenchymatous organ can be considered as a map of the mechanical properties of the tissue, or as an approximate map of the distribution of collagen and elastin fibers. Nearly all parenchymatous organs present a similar echogenicity although their fine structure varies considerably . Large concentrations of collagen,

such as those seen in the walls of blood vessels or along fascial planes produce echo returns greater than the parenchymatous background.

Fluid-filled structures show no, or extremely small discontinuties and yield echo returns only from their walls.

The greatest inherent contrasts are between fluid-filled structures and their surrounding parenchyma and between gas and bone and parenchyma . Vessels and ducts provide the major ultrasound anatomical landmarks and navigational reference points. Gas and bone occlude visualization and render scanning possible only through a series of available acoustic windows.

Ultrasound is attenuated to a variable degree by different tissues. The signal processing imposes a standard compensation for attenuation in order to render the apparent echogenicity of similar structures independent of depth. Fluid-filled structures which attenuate very little will therefore demonstrate over-compensation of echoes lying distally . This is called distal enhancement. Dense structures, such as gall stones or fibrous tumors, attenuate more than the standard value and produce distal shadowing. Considerable information about the density of tissues can be achieved by studying these effects in the ultrasound image. The introduction of the completely digital ultrasound machines means that the fundamental information is available in a form that can be analysed by the on-board computer and tissue characterization will soon become a standard feature.

R E V I E W O F L I T E R A T U R E

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Medical use of ultrasonography is an out growth of experience gained with sonar during world war II.

The introduction in 1974 of grey scale imaging which renders varying echo intensities as different shades of gray, markedly increased the amount of information contained in the final ultrasonographic image. Further developments of ultrasonic imaging devices has allowed real-time imaging, enabiling examination of cardiac and foetal motion. An important limitation of technique. however is that the experience and skill of the person performing the examination greatly influences the quality of information displayed in the final image.

Discrimination of leisons by ultrasonography depends upon tissue differences in sound transmission which seems to be primarily related to elasticity or collagen content of the tissue.

Ultrasound waves are very poorly propagated through air and bone, and body parts obscured by either can not be examined satisfactorily. However, in patients in whom fat is lacking reliable separation of continguous organs may be impossible. Ultrasonic evaluation in these patients may prove rewarding where as examination of obese patient may be lessproductive, because ultrasound is not particularly well transmitted through fat.

In summary, selection of an appropriate radiographic imaging modalities require consideration of the area and organ system to be examined, the body habitus of the patient, and the skill of the examiner.

The imaging flexibility of real time sonography has markedly enhanced sonographic, evaluation of abdominal structures. Most importantly, the dynamic aspect of real-time sonography allows for optimal imaging of a particular area of intrest within the abdomen. Real-time sonographic devices, especially those that utilize small transducer heads, allow for imaging of the upper abdomen utilizing the intercostal spaces as "sonic window" similarly deeper structures can be imaged through a solid organ thus avoiding problems created by imaging through gas containing bowel.

In general sonography is an excellent initial examination for most abdominal disorder (Whalen , 1979) Real-time sonography has had its greatest impact in evaluation of the gall bladder and biliary tract.

INDICATIONS :

The most common indication for abdominal real-time sonography include the following :

1. Evaluation of possible gall bladder disorders.
2. Detection of biliary obstruction.
3. Evaluation of the pancreas.
4. Evaluation of hepatic masses.
5. Screening for an abdominal aortic aneurysm.

6. Evaluation of abdominal lumps in the various abdominal quadrants and characterisation of suspected abdominal disorders associated with illfeeling, weight loss, or fever of unknown origin.

7. Sonographic guidance of aspiration and needle biopsy procedures.

Sonography should be utilized as the first modality for evaluation of children with an abdominal mass (Brasch et al, 1980). Real-time sonography is usefull in determiningthe origin of the mass and its location as well as involvement of other structures. Real-time sonography is helpful in establishing whether a mass arises from or involves the kidneys. Largepelvic masses may present as abdominal masses in children.

Cystic intra-abdominal masses most likely arise from the mesentry or embryologic remnants related to gastro intestinal or genitourinary tract. Cystic abdominal masses are most commonly mesentric cysts, Urachal cyst or gastro-intestinal duplication cyst (Kangarloo et al, 1979 ; Wicks et al, 1978 ; Williams and Fisk, 1981). Abdominal ultrasonography was confirmatory in diagnosis a mesentric cyst presenting as ascites (Marvin J. et al, 1975). Mesentric cysts actually arise at or near the root of the mesentry and may contain septations. The masses usually displace bowel loops anteriorly and laterally. Gastro-intestinal duplication cysts usually arise from the

ileocaecal region and usually do not communicate with the bowel lumen. The wall of a gastrointestinal duplication cyst tends to be thicker than that of a mesentric cysts. Perforation of the bowel with spillage of meconium can also result in a cystic mass in neonate (Carroll and Moskowitz, 1981). The masses associated with meconium peritionitis and bowel perforation appearas complex masses, usually with an echogenic, calcified rim.

Some uncommon cystic masses that can be detected sonographically include an anterior sacral menigomyelocoel (Mc Creath and Macpherson, 1980). In children with ventriculo peritoneal shunts, a collection of cerebiospinal fluid can become localized at the distal shunt tip resulting in impaired carebrospinal fluid drainage (Fries et al, 1980). These masses appear as cystic mid abdominal masses in proximity to the distal (pefitoneal) shunt tip. Large cystic intra-abdominal masses can be encountered secondary to traumatic pancreatitis. These cystic masses represent pancreatic pseudocysts. Cysts may also arise from spleen. Spleenic cysts may be congenital or acquired. Ocassionally hemolyzed blood within a spleenic haematoma will appear as a cystic related to the spleen (Lupien and Sauerbrei, 1984).

Spleenic enlargement and/or rupture such as that encountered with mononucleosis can be detected sonographically (Johnson et al, 1981).

Complex masses within the abdomen may arise from bowel disorder. For example, intussusception appears as a mass with central echogenicity surrounded by ahypoechoic halo (Bowerman et al, 1982). The wall may contain several linear interfaces representing the walls of the telescoped portion of the bowel. An attempt reduction of intussusception may be indicated, utilizing a barium enema, once this condition is detected sonographically. Thickening of bowel wall may also occur in inflammatory processes such as Crohn's disease or Neoplastic infiltration such as lymphoma (Miller et al, 1980). Haemorrhage within the wall such as seen with Henoch-Schoulein purpura may also result in thickening of the wall of a segment of bowel.

Ocassionally, sonography is helpful in establishing the diagnosis of peri appendicular abscess. These masses appear as complex collection usually in right lower quadrant or along the region of the paracolic recess (Pearson, 1988 ; Chou et al, 1987).

Solid masses within the abdomen may arise from enlarged lymphnodes. Lymphadenopathy can be encountered in several types of lymphomas. In general Hodgkin's lymphomas are usually associated with mediastinal and para aortic lymphadenopathy, where as non-Hodgkin's lymphomas typically affect mesentric and/or hilar lymphnodes. The American form of Burckitt's Lymphoma tends to produce abdominal and pelvic masses, which enlarge quite rapidly (Dunnick et al, 1979). Pelvic lymphadenopathy can result in bilateral obstructive uropathy.

In pyloric stenosis the hypertrophied muscle appears as hypoechoic whereas central lumen is echogenic. On short axis the hyper-trophied muscle and echogenic lumen appear as 'target' where as 1 on long axis the hypertrophied pyloric muscle and echogenic lumen appear as on "Eclair" with an echogenic central portion surrounded by hypoechoic muscle (Hafden et al, 1984 ; Strauss et al, 1981 ; Blumhagen and coomb's 1981 ; Ball et al, 1983). Blumhagen and Nobel , 1983).In addition hypertrophic pyloric stenosis is associated with increased length of the pyloric canal lengths of 1.4 cmare considered abnormal (Wilson and Vanhoutte, 1984). Recurrence of muscle hypertrophy after surgical correction can also be detected sonographically (Sauer brei and Paloschi, 1983).

PELVIC MASS EVALUATION :

The majority of pelvic and pelvo-abdominal masses encountered in the female child are related to the ovary. Rarely a pelvic mass is non-ovarian in origin, such as pelvic neuro blastoma. In general cystic masses encountered in a neonate upto 2 years of age are physiologic ovarian cysts, whereas 5 to 15 years of age, Most ovarian masses represent teratomas 30% of which are malignant (Towne,1975). Since it is soft and compressible, it extends to fill the entire abdomen.

RENAL MASSES :

In the neonate, a solid intrarenal mass is most commonly a mesoblastic nephroma. Mesoblastic nephromas can

also contain a single or septated cystic area (Grider et al, 1981). The tumor is benign, since it is a hamartoma (Hartman and Sanders, 1982). Another condition that can be associated with renal enlargement in a neonate is Nephroblastomatosis. This condition is thought to be a result of renal developmental arrest during the later foetal stage, in which the less than totally differentiated nephronspredominate (Franken et al, 1982).

Multilocular cystic nephroma appears as an intrarenal cystic mass that contains numerous Septations. This tumor is most frequently encountered in older children. The multicystic form of a mesoblastic nephroma is seen more often in younger infants (Madewell et al, 1983).

In infant and young child, solid masses within the kidney are most commonly a wilms tumor (Jaffe et al, 1981). The most common sonographic appearance of wilm's tumoris a homogenously solid, echogenic mass when compared to sonographic appearance of neuroblastomas, wilm's tumor tends to contain hypoechoic areas representing focal areas of internal haemorrhage (Hart man and Sanders, 1982) wilm's tumor can extend into the renal vein and inferior vena cava (Slovis et al, 1981).

Ocassionally, parenchymal infiltration and enlargement from inflammatory processes can appear sonographically as an interarenal mass. For example, lobar bacterial nephritis can appear as a focal mass of relative hypoechogenicity (Siegel and Glasier, 1981). This condition is thought to result from ureteral reflux of bacteria.

The adrenal of a neonate appears as a triangle shaped or comma-shaped structure superior to the upper pole of each kidney (Silver man et al, 1980).

The most common adrenal mass that is encountered in a child is the neuroblastoma. These are moderately echogenic masses that may demonstrate focal areas of echogenicity and shadowing in areas of calcification (White et al, 1983).

Another disorder that can be encountered in the neonate and infant is adrenal haemorrhage. This is usually associated with an episode of severe stress. In the acute phase, hemorrhage into the adrenal gland will appear hypoechoic with adrenal itself markedly enlarged (Pery et al, 1981).

Enlarged ovaries that contain luteinized cysts may be prone to torsion (Graif et al, 1984 ; Warner and Fleischer, 1984). Hemorrhage within physiologic cyst typically appears as echogenic areas within an enlarged pelvic structure. The contents of the cysts usually become less echogenic as the clot undergoes fibrinolysis (Bass et al, 1984). One should be aware that ovarain cysts in the neonate can present outside of the pelvis and frequently in upper abdomen. With leukemic infiltrate the ovary can be noticeably enlarged on sonography. It is important to be aware of the possibility, since the ovary can be site for tumor sequestration (Bicker et al, 1981). When ovary is enlarged, either by cyst, internal haemorrhage or intermittent torsion, It can present as a

pelvoabdominal or pelvic mass. If torsion is incomplete, venous drainage and lymphatic drainage are first affected (Warner and Fleischer, 1984). In these cases, the ovary can enlarge over a few days and appear as a solid mass (Graif et al, 1984 ; Warner et al, 1984). In the cases of torsion that are associated with an intraovarian mass, a complex pelvo-abdominal mass is usually identified, in our series. Most patients with ovarian torsion have a history of intermittent pelvic pain (Warner et al, 1984).

There are certain pelvic and pelvoabdominal masses that mimic the finding of an ovarain mass. These include mesentric cysts and gastrointestinal duplication cyst. There are several disorders that may be depicted on sonography that involve the uterus. One of these is hydrometrocolpos. In this condition, there is accumulationblood in the uterus and/or upper vagina usually due to an imperforate hymen, vaginal stenosis or atresia (Schaffer et al, 1983). Bicornuate uterus and some other type of uterine malformations can be detected prospectively with sonography (Malini et al, 1984). One must evaluate the kidneys when a patient with a uterine abnormality is found, since such abnormalities have an association with renal anomalies such as unilateral renal agenesis.

Only a few masses that arise from the uterus are encountered in the paediatric age group. One of the most common is sarcoma Botryoides, which arises as a solid mass arising from the uterus (Woodring et al, 1982). There have been some cases in which the mass could not be readily palpated.

Large retroperitoneal masses may mimic masses that arise within the abdomen. In general, however real-time sonography isnot as accurate as computed tomography for evaluation of retroperitoneum.

The retroperitoneum consists of basically three compartments (Meyers, 1976) these include the anterior pararenal space, which includes the pancreas, as-cending and descending colon, and great vessels. The inflammatory or neoplastic processes that occur in an organ in this compartment can effect other structures within the area of the retroperitoneum. The perirenal space surrounds both kidney's and is not continuous across the midline. The posterior para renal space does not contain organs but is typically affected by hemorrhage and inflammatory condition. Haemorrhage occuring in the retroperitoneum appears as an illdefined area of moderate echogenicity which tends to obscure organ outline (Kumari et al,1979).

Retroperitoneal fibrosis is usually associated with a hypoechoic mid line mass that is located anterior to the aorta and inferior venacava. It is usually associated with bilateral ureteric obstruction at the level of mid-ureter (Fagan et al, 1979).

In general, sonography can be used to evaluate post surgical abdominal wall haematomas or abscesses. The use of sonography for identification of peritoneal tumor and implants has been described (Yeh, 1979).

BOWEL :

Real-time sonography can be effectively utilized to delineate normal and abnormal bowel by depiction of its typical configuration and peristalsis. Real-time evaluation of bowel is utilized in water distension techniques of upper abdomen and pelvis as well as in detecting some leisons that are occult on plain film and contrast radiographic examination (Fleischer et al, 1982 b).

The typical appearance of a collapsed bowel loop is one of " target " configuration. The central echogenicity represents mucous and gas, whereas the halo represents the bowel wall itself. In general the bowel wall should not measure more than 3mm in thickness and should be symetrical to the echogenic core (Fleischer et al, 1980 a) when a loop is fluid filled, the mucosal folds can be recognised (Fleischer et al, 1979 ; Oliva et al, 1981). Since real-time sonography is utilized very frequently as the first diagnostic examination, abnormalities in bowel loops may be detected that are not suspected clinically (Fleischer et al, 1980 b).

Abnormal thickening of the bowel wall secondary to tumor infiltration, intussusception, or inflamatory or haemorrhagic processes has been detected during real-time examination. All there processes result in an enlarged target configuration when the bowel loop is examined is short axis. Thickening in bowel wall greater than 5 cm can be detected but is non specific (Yeh and Rabinowitz, 1981). Several neoplastic and inflammatory condition as well haemorrhage secondary to ischaemia can produce bowel wall thickening

(Fleischer et al, 1980 a; Bluth and Merritt, 1979 ; Kajtoria et al, 1979 ; Morgan et al, 1980). Inflammatory processes specifically those associated with Crohn's disease and lymphoma , commonly produce, Sonographically recognisable thickening of the bowel wall (Miller et al, 1980). Thickening due to pseudomembranous colitis, a condition related to antibiotic usage can be detected and followed for signs of improvement with treatment (Bolondi et al, 1985). Similarly, colonic diverticulum can be recognised by the thickening of the bowel wall (Parulekar, 1985). Trans rectal sonography has been used to assess the extent of perirectal extension of the rectal tumors (Rifkin and Mark's 1985). This technique can be used for tumors located 12 cm from the anus and has an accuracy comparable to C T assessment.

Because of variable delineation of retroperitoneal structures deep to the bowel by sonography, lymphadenopathy is best detected by computed tomography or magnetic resonance imaging. However, when massive para-aortic or mesentric lymphadenopathy is present, it can be detected by sonography performed for evaluation of a pulsatile abdominal mass (Ritche, 1982).

In general, lymph nodes appear as hypoechoic, rounded masses that are located in typical locations for node bearing groups (Carroll and Ta, 1980 ; Hillman and Haber, 1980). Para-aortic lymphadenopathy results in

overall enlargement of the area surrounding the aorta and inferior vena cava. Lymphadenopathy can also be detected in the hepatic, spleenic and the renal hila (Ginaldi et al, 1981). Lymphadenopathy can occur near the pancreatic head as a result of a variety of lymphomas and other metastatic tumors (Schnur et al, 1982).

The " Sandwich sign " is created by septation and division of the lymphatic mass by the root of the mesentry (Mueller et al, 1980). In some patients, enlarged mesentric nodes are mobile and can Simulate the sonographic appearance of abnormal bowel (Bardley et al, 1980). It is difficult to detect lymphadenopathy associated with gynaecological masses. This is probably a result of over lying bowel loops present within the pelvis.

Sonography has an important role in evaluating the patient with a suspected localized abscess. If there are no localizing signs in a patient with suspected abscess, a gallium-67 or Indium -133 labelled leucocyte scan can be performed to localize a potential area of abscess collection (Carroll et al, 1981 ; Knochel et al, 1990 ; Mc Neal et al, 1981, 1982). On sonography, abscesses range from an echoic to moderately echogenic, depending on the amount of gas and cellular debris within the abscess (Subramanyam et al,1983).

One should be aware of the predilection of particular areas of abscess localization (Meyers, 1976 ; Berger et al, 1979). A small amount of non-infected fluid (5- 10 cc) can be present in the gall bladder bed after

cholecystectomy (Neff et al, 1983). Variation in the typical sonographic appearance of abscesses as well as in their location may occur. Abscesses that are due to gas-forming organisms may demonstrate very echogenic appearance (Kressels and filly, 1978).

Once an abscess is located, sonography can beutilized to guide catheter placement and drainage (Van Somenberg et al, 1982 ; Kulig owska et al, 1982 ; Pawar et al, 1982). The course of the catheter should avoid bowel.

Liver cysts have been described as a common occurrence in individual over 50 years of age (Roemer, et al, 1981). It has been reported that approximately one-third of patients over 50 will have either a renal or liver cyst (Mc Clennan et al, 1979). A simple cyst of the liver appears as a well defined, an echoic mass usually associated with distal acoustic enhancement . Low level echoes may be encountered in cysts that contain haemorrhage. Hepatic cysts usually recur after needle aspiration (Saini et al, 1983).

Intrahepatic abscesses usually have a complex sonographic appearance. Initially, they may be highly echogenic owing to gas-forming organisms (Kressel and Filly, 1978 ; Gosink, 1981 a ; Rubinson et al, 1980). In the more chronic abscesses, however, an echoic areas correspond to areas of purulent material (Newlin et al, 1981). Hydatid abscesses usually appears as predominantly

cystic masses that may appear as irregular hypoechoic or hyperechoic areas depending upon the amount of fibrous tissue interspersed among the fat (Scatarige et al,1984). The areas of focal fatty infiltration usually demonstrate angulated geometric margins between normal fatty tissue (Quinn and Gosink , 1985). Complex liver masses may represent haemgiomas and some other types of primary and secondary liver tumors such as hepatocellular carcinoma (Kemin et al, 1979). Haemangiomas are the most common leisons in the liver. Usually, these appear as echogenic masses (Bree et al, 1983 ; Taboury et al, 1983 ; Itai et al, 1983). Hepatocellular carcinoma has been associated with invasion of hepatic vein and inferior vena cava (Tanaka et al, 1983 ; Subramanayam et al, 1984) when hepatic tumors are found with cirrhosis they may be difficult to distinguish from surrounding abnormal liver (Cottone et al, 1983) Focal nodular hyperplasia is thought to occur as the result of thrombosis of vessel with regrowth of hepatic tissue along fibrous strands (Rogers et al, 1981). This morphology gives rise to the characteristic angiographic appearance of a " Spoke wheel " configuration of the vessels supplying the mass (Sandler et al, 1980). Sonography can be usefull in detecting haematomas within the liver that occur secondary to traumaor that are iatrogenic . In the initial stage, hematomas tend to be moderately echogenic. After a few days, the hematoma usually becomes less echogenic (Wicks et al, 1970).

Embolic abscesses can appear as echogenic masses within the liver. If suppuration has occurred within the abscess the leisons may contain a hypoeehoic centre (Ho et al, 1982). Extra hepatic masses can usually be differenciated from intra-hepatic masses based on the displacement of perirenal fat (Gore et al, 1982 ; Graif et al, 1983). The improved resolution of real time sonography and improved flexibility of sonographic examination of liver has increased the diagnostic utilization of sonography in detection of intra hepatic masses as metastases (Alderson et al, 1983).

Certain land marks can be utilized for localization of the gall bladder. In the sagitial plane an echogenic interface arising from the main lobar fissure of liver can be identified and is usually directed towards the neck of the gall bladder (Callen and Filly, 1979). When the gall-bladder is fully distended the wall of the gall bladder appears as a thin echogenic interface. Thickening of the gall-bladder wall can be recognised when bothe sides of the gall bladder can be clearly outlined (Sanders, 1980). Gall-bladder thickening can occur in many conditions beside acute cholecystitis, such as those associated with hypoalbuminemia, renal disease, hepatitis and pancreatitis (Ralls et al, 1981 ; Fiske et al, 1980). There are a variety of non-physiologic conditions that can be associated with gall-bladder wall thickening. These include cardiac dysfunction, lymphadenopathy with obstruction of lymphatic return, right upper quadrant inflammatory processes and hyperplastic

chdecystoses (Berk et al, 1983). Sonography can detect the contiguity of the duplicated segment with the remainder of the gall bladder and the presence of any calculi in these seperated segments (Murayamn et al, 1985). Occassionaly a fibrous band that crosses the fundus of a malformed gall bladder can mimic, The sonographic appearance of a duplicated gall bladder (Golney et al, 1985).

Artifact that should be recognised is due to the partial volume effect of the liver, producing echoes that are superimposed within the gall-bladder lumen. (Fiske and Filly, 1982).

Real-time sonography is helpful in indentifying echogenic structures, such as gas-containing duodenum or colon that surround the gall bladder (Fleischer et al, 1984 a).

Sonography is a very sensitive and specific diagnostic modality for detection of gall-stones. Detection of calculi that measure less than 2 to 3 mm. is not uncommon (Copperberg et al, 1979). Recognition of gall-stones is enhanced by the acoustical shadowing which must be elicited during real-time examination (Taylor et al, 1970). It is felt that in order to elicit a shadow distil to a gall stone, The gallstone must be imaged in near normal (perpendicular to the skin) angulation to the incident beam and within the optimal focal zone of the transducer (Gonzalez and Macintyre, 1980). All type of gall-bladder stones demonstrates shadowing distal to the gall bladder. Stones tends to float in patients when gall bladders contain cholecystographic contrast media, owing

Echogenic foci can be observed within sludge.These probably represent very fine, small gallstones or 'gravel' (Filly et al, 1980). Low level echoes arising from a partial volume effect of the liver can simulate the sonographic appearance of sludge (Fiske and Filly , 1982). Occassionally patient may be asked to rollover several times in order to mix the contents of the gall bladder with the stone in an attempt to make the stone float and thus make it more apparent sonographically (Cunningham et al, 1981).

The relative position of the stone within the gall bladder may influence whether or not a shadow is observed (Taylor et al, 1979 ; Filley et al, 1979). One can also utilize the linear echogenic interface arising from the main lobar fissure as a anatomic landmark for identification of the contracted gall bladder in cases where gall bladder cannot be adequately visualized.

The presence of gall bladder calculus does not always indicate that inflammation of gall bladder is present (Gracie and Ransonoff, 1982). However, cholecystectomy is usually justified on the basis of the fact that a significant number of patients with a stone can develop complications such as gall bladder perforation within one year of the examination (Schwartz 1976). Real-time sonography can establish thatpatients pain comes from the gall bladder. For instance, when scanning

the patient for a painfull gall bladder fundus with the real-time transducer head may replicate the patients pain (Murphy's Sign of acute cholecystitis) sonographically, patients with acute cholecystitis usually demonstrate an abnormally thickened gall bladder wall (Kane, 1984 ; Laing et al, 1981 ; Marchal et al, 1979 ; Mindell and Ring, 1979 ; Raghvendra et al, 1981). However, many conditions besides acute cholecystitis can produce apparent gall bladder wall thickening (Handler , 1979 ; Finberg and Birnholz, 1979 ; Shlaer et al, 1981 ; Ralls et al, 1981 a). These include patients with hypoalbuminemia, renal failure, pancreatitis and hepatitis (Fiske et al, 1980 ; Sanders, 1980 ; Juttner et al, 1982 ; Engel et al, 1980). Rarely, patients with adenomyomatosis or gall bladder carcinoma demonstrate a sonographic appearance that mimics that of acute cholecystitis (Yeh, 1979 ; Rice et al, 1981 ; Raghavendra et al, 1983 ; Price et al, 1982). In necrotizing cholecystitis, thelayer of desquamated mucosa will appear as an intra luminal interface projecting from the wall of the gall bladder (Wales, 1982). If sonography demonstrates an apparently normal gall bladder without calculi, hepatobiliary scintigraphy can be utilized for documentation of acute cholecystitis (Weissman et al, 1979). False positive hepatobiliary scans can occur in patients on hyperalimentation or in patients who are alcoholic and have a chronically distended gall bladder, filled with sludge (Shuman et al, 1982). Sonography can be used for guiding percutaneous transhepatic cholecystostomy in patients with acute calculous cholecystitis. Decompression of bile in these gall -

bladders, which are usually infected, is accomplished by needle aspiration through the region of the body of the gall bladder (Eggermont et al, 1985).

Cholecystokinin or fatty meal can be given to evaluate the ability of gall bladder to contract (Fein et al , 1984 ; Davis et al, 1982). Gangrenous cholecystitis can be detected on sonography by the finding of an usually thick wall that has focal textural irregularities (Jeffrey et al, 1983 ; Parulekar, 1982). If perforation of the wall has occured, as fluid collection can usually be recognized surrounding the gall bladder. Upper abdominal trauma may lacerate the liver, leading to extravasation of blood into gall bladder lumen (Haematobilla).

Another condition that can be diagnosed sonographically is gall bladder carcinoma (Yeh , 1979 ; Yum and Fink, 1980 ; Rviz et al, 1980). Gall bladder carcinoma is frequently associated with gall bladder calculi and/or calcification of the gall bladder wall (Kane et al, 1984). Gall bladder carcinoma can also appear as a fungating mass arising from the gall bladder lumen and growing into the liver and right upper quadrant structures (Weiner et al, 1984).

In some cases, focal thickening and irregularity of the gall bladder wall detected by sonography represents adenomyosis or one of the hyperplastic cholecystoses. Sonography can detect focal thickening of the gallbladder

wall resulting from adenomyosis of the gall bladder (Carter et al, 1978 ; Berk et al, 1983). In the more advanced stages of this disorder, the cystic spaces within the gall bladder representing the Rokintansky Aschoff sinuses have been observed sonographically (Rice et al, 1981). Polyps of gall bladder appear as echogenic intra-luminal projections that are stationary as opposed to folds that change in configuration with respiration (Rhue et al, 1979). Perforation of gall-bladder may be secondary to trauma, associated with wall ischaemia and/or gangrene, or the result of long, standing cystic duct obstruction secondary to an impacted stone (Fleischer et al, 1982 a). Inflammatory fluid can surround the gall bladder in fulminant cholecystitis (Carde et al, 1980).

In some patients, it may be difficult to identify the gall bladder when it is not distended (Harbin et al, 1979). Typically the location of gall bladder can be determined by identifying the linear echogenic interface corresponding to the main lobar fissure of the liver. This line should point towards the area of the gall bladder neck (Callen and Filly 1979). It is not uncommon to detect a small amount of fluid around the gall bladder fossae after cholecystectomy (Elboim et al, 1983). In the near future ultrasonic lithotripsy might be used for percutaneous dissolution of gall stones (Galetta et al, 1984).

Real time sonography is usefull in the detection of most types of choledochal cysts. Choledochal cyst are

thought to arise as sequelae of the abnormal formation of the pancreatic duct, distal common bile duct junction with subsequent reflux of pancreatic juices into the common duct (Babbitt et al, 1981). There are several types of choledocal cysts (Han et al, 1981). These include aneury-smal dilatation of the entire common bile duct (Type-1), a cystic diverticulium arising from the common bile duct and/or hepatic ducts (Type-II) and choledochocoel, which is the out pouching of the distal common duct within the duodenal wall (Type-III), (Kangarloo et al, 1980). If choledochal cyst is suspected sonographically, hepatobiliary scanning may be helpful in confirming the sonographic impression of choledochal cyst (Fleischer et al, 1980).

In acute pancreatitis, the pancreas is usually enlargedsecondary to intraparenchymal oedema and haemorrhage. The texture of the parenchyma is usually hypoechoic or of mixed echogenicity as a result of intraparenchymal haemorrhage. Sonography is particularly helpful in indentifying patients who do not improve on conventional therapy after the diagnosis of acute pancreatitis is made. More specifically, sonography is helpful in indentifying pancreatic pseudocyst. These masses are usually in the region of the pancreas but may be present in the pelvis or even in the mediastinum. They are usually hypoechoic but can contain internal echoes. They typically enlarge

during their early development and then become stable in size. Rarely they can erode into a bowel loop and spontaneously decompress (Sarti, 1977). Their appearance is usually more cystic than some of the complex pancreatic tumors. Such as cystadenocarcinoma of the pancreas (Carroll and sample , 1978).

In chronic pancreatitis, the pancreas is small and echogenic and may be indeed difficult to delineate. Focal areas of echogenicity may arise from calcification within the pancreas and/or stones within the pancreatic duct (Weinstein et al, 1980 ; Shawker, et al, 1984).

Haemorrhagic pancreatitis may produce marked enlargement of pancreas with focal echoic and hypoechoic areas corresponding to acute and chronic haemorrhage. However, since the sonographic appearance of this condition as well as pancreatic abscess is not as clear as its appearance on computed tomography, we advocate the use of computed tomography where ever this condition is suspected clinically (Fleischer and Colicam, 1979).

Sonography can demonstrate an area of decreased echogenicity corrosponding to the pancreatic tumor itself (Taylor et al, 1981). If a mass cannot be confidently diagnosed as either focal pancreatitis or tumor a guided aspiration is usually necessary (Neff et al, 1984).

Although seeding of the tumor in the needle tract has been reported in one case of pancreatic carcinoma. This procedure is usually safe and effective (Kim et al,1982). Peripancreatic lymphadenopathy can simulate the appearance of carcinoma of the pancreatic head (Schner et al, 1982).

A rare type of pancreatic tumor can be recognized sonographically as distinct from a pseudocyst. This is the cystodenoma or cystadeno carcinoma of the pancreas. These masses are usually large and appear as complex, predominantly solid masses ; usually within the tail of the pancreas (Carrol and Sample , 1978 ; Freeney et al, 1973). Favourable results can be obtained by surgical resection of this tumor, other endocrinologically active tumors of the pancreas such as glucagonoma and some Islet cell carcinomas may be small and difficult to detect by sonography (Shawker et al, 1982 ; Kuhn et al, 1982). Sonography can be used intra-operatively to locate there tumors and thus tailor pancreatic resection relative to the location and size of the tumor (Charboneau et al, 1983 ; Rifkin and Weiss, 1984). Misdiagnosis can be considered in two major categories ; those that are false positive and those that are false negative. In addition misdiagnosis may be considered on the basis of perceptive and congnitive factors. Circumstances that can lead to false positive misdiagnosis include the following :

1. Misinterpreetation of the findings of an intra-uterine pregancy for ectopic pregnancy.

2. Recognizing an actopic pregnancy and rendering the diagnosis of intra uterine pregnancy.

3. Mis diagnosis of a hypoechoic temporal lobe in a 26 to 36 week foetus for hydrocephalus.

4. Echogenic abdominal areas misdiagnosed as an abdominal disorder. When a normal structure is actually represented.

5. Interpretation of anatomic widening of the inter-pediculate space of the sacral spine as an abnormal widening representing dysphraphism.

6. Compressed abdomen of the foetus during the examination being interpreted as an omphalocele, especially when associated with oligohydraminos.

7. Sustained uterine contractions of the lower uterine segment misdiagnosed as placenta previa or as an abdominal ectopic pregnancy.

8. The appearance of prominent retroplacental vein felt to represent an area of placental abruption.

9. An uncharacteristic appearance of gall stones mistaken for polyps and vice versa.

10. Cystic lesions of breast mistaken for a solid tumor and converse.

Those situations that can lead to false negative misdiagnoses include the following :

1. Ectopic pregnancy diagnosed as a normal pregnancy with or without an associated corpus luteum cyst.

2. A small meningomyelocoel missed or compressed by surrounding uterus and/or placenta, rendering it difficult

to detect. This may be a factor in wrongfull birth and wrongfull life cases (James, 1986 ; Bundy , 1985).

3. Other small foetal structural anomalies such as polydactly or cardiac valvular malformations.

4. Gall bladder polyps for gall stones.

5. In ability to detect a structural anomally even though screening tests, such as maternal serum α-fetoprotein or Haemoglobin A_{ic} are abnormal.

The sonographic evaluation of ectopic pregnancy is particularly prone to misdiagnosis both false positive and false negative (James 1986) cases being common.

Additionally we have considered the use of ultrasonic energy so bereft of potential biological hazards that the proper use, time criteria, and power levels have been quite liberal (James , 1985 ; Nyborg , 1983).

Improper functioning of the instrumentation may or may not absolve the physician from liability in a suit regarding biological hazards or failure to diagnose (Dubin. V. Michael Reese Hospital) correctly.

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MATERIAL AND METHODS

This study was conducted at Maharani Laxmi Bai Medidal College Hospital, Jhansi over a period of one year i.e. from May 1990 to June 1991. The cases in this study were selected from all those patients who were admitted in the surgery wards or referred from other wards. Most of the patients were those who had lump in the abdomen. A preoperative diagnosis was made after thorough clinical biochemical and pathological investigation. The patients were then subjected to ultrasonographic scanning by using a sector real-time ultrasound machine using a transducer of 3.5 magahertz, and an ultrasound diagnosis was made. Then the patient was operated and a final diagnosis was made on the basis of operative and histopathological examination.

1. DETAILED HISTORY AND THOROUGH PHYSICAL EXAMINATION :

DETAILED HISTORY :

A detailed history of the patient was taken particulars of the patient e.g. age, sex, socioeconomic status, occupation etc. were noted in each case.

The presenting complaints were recorded in chronological order and elaborated under the heading of history of present illness.

History of past illness like tuberculosis, Jaundice, Haematuria, fever, etc. was noted. Personal history with the marital status, feeding habbits etc was also noted.

PHYSICAL EXAMINATION :

This was carried out under the following heads :-

A. GENERAL EXAMINATION :

General condition of the patient was noted . We noted the pulse, blood pressure, temperature, respiratory rate, anaemia, Jaundice, cyanosis, clubbing, hydration, lymphadenopathy and oedema etc.

B. SYSTEMIC EXAMINATION :

Each system was examined thoroughly e.g.

- Respiratory system
- Cardiovascular system
- Musculoskeletal system
- Gastro intestinal system
- Genito urinary system.

C. LOCAL EXAMINATION :

In examination of abdomen, the following points were noted :-

- Shape of the abdomen
- Distension of abdomen
- Respiratory movement
- Umblicus
- Liver and spleen and any other organomegaly
- Hernial sites
- Testes (in males)
- Any scar over abdomen
- Any evidence of fluid inside the peritoneal cavity.

- Any particular site of tenderness
- Per-rectal examination
- Per vaginal examination (In females)

EXAMINATION OF LUMP :

- Site of lump
- Extent
- Size
- Shape
- Margins
- Surface
- Mobility
- Consistency
- Movement with respiration
- Fixity

2- BLOOD STUDY :

- Leishman stain
- Total leucocyte count
- Differential leucocyte count
- Estimation of Haemoglobin
- Erythrocyte sedimenation rate

3- BIOCHEMICAL STUDY :

- Blood urea
- Blood sugar
- Serum electrolyte
  - Sodium
  - Potassium
  - Calcium

- Serum creatinine
- Serum Amylase
- S.G.P.T.
- S.G.O.T.
- L.F.T.
    - Total serum proteins
    - Serum albumin
    - Serum globulin
    - A : G ratio
    - Serum bilirubin
    - Van-Den berg test
    - Thymol turbidity

PERITONEAL ASPIRATE :

In suitable cases, peritoneal aspiration was done from the four quadrants of the abdomen. After cleaning the part local anaesthetic agent was infilterated and an aspiration needle introduced in the peritoneal cavity and fluid from the peritoneal cavity was aspirated . Bio-chemical and cytological study of the aspirated fluid was done.

4- STOOL :

(1) Stool was examined for parasites ova and cyst.

(2) Stool was also examined for occult blood.

5- URINE :

- Albumin
- Sugar
- Microscopic (R.B.C.)

- Culture and sensitivity
- Bile salts and bile pigments

6- ALLERGIC AND DERMATOLOGICAL TEST :

- Casoni's test
- Mantoux test.

FINE NEEDLE ASPIRATION CYTOLOGY :

It was done in suitable cases.

RADIOLOGICAL EXAMINATION :

Plain skiogram abdomen was done to see for any shadow of the lump and also for any radio opaque shadow in lump.

INTERAVENOUS PYELOGRAPHY :

It was done in cases of lump of renal origin.

ULTRASONOGRAPHY :

The patient was subjected to ultrasonography. Sector real time ultrasound mechine with 3.5 mega Hertz transducer was used. Patient was prepared by asking him not to take any food or drink 6-10 hours before ultrasonography. The patient was usually placed in supine position. But position of patient was changed according to site and size of lump.

A lubricant jelly was applied to the part to be examined. Then the transducer was moved over the part and series of films were taken and finally an ultrasound diagnosis was made.

Patientsfit for operation were subjected to exploratory lapratomy. If possible excision of the lump was done. If excision was not possible wedge biopsy was taken. A per-operative diagnosis was made which was later confirmed by histopathological examination . In those patients who were not fit for operation, a fine needle aspiration cytology was done and tissue was sent for histopathological examination.

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O B S E R V A T I O N

Present study was conducted in the Department of Surgery, Maharani Laxmi Bai Medical College Hospital, Jhansi ona series of 60 patients of either sex and all age groups, in one year period between May 1990 to June 1991.

Twenty six males and thirty four females constituted the group (Table -I).

TABLE - I

Distribution of patients according to sex .

Sex	Number of patients	Percentage
Male	26	43.3%
Female	34	56.7%
Total	60	100 %

Table - I shows that the distribution of patients according to sex. Out of the sixty patients, thirty four were female and twenty six were males.

TABLE - II

Distribution of patients according to age groups is shown in table -II

Age group (In years)	Number of patients	Percentage
0 - 15	6	10.0%
16 - 30	9	15.0%
31 - 45	19	31.6%
46 - 60	10	16.6%
61 - 75	16	26.6%

Table - II reveals distribution of patients according to their age in years. Six patients belonged to age group 0 - 15 years, Nine patients belonged to age group of 16 - 30 years, Nineteen patients belonged to age group of 31- 45 years and ten patients belonged to age group of 46 - 60 years and sixteen patients belonged to the age group of 61 - 75 years.

Distribution of lumps according to organ of origin is shown in table -III.

TABLE -III

Organ	No. of cases	Percentage
Gall bladder	14	23.3
Liver	7	11.6
Kidney	7	11.6
Intestine	3	5.0
Retro peritoneum	6	10.0
Pelvis	3	5.0
Uterus and ovaries	10	16.6
Mesentry	5	8.3
Pancreas	3	5.0
Abscess	2	3.3

Table - III shows the distribution of patients with lump in abdomen according to the organ of origin. Fourteen patients presented with lump of suspected gall-bladder origin, seven presented with lump of liver origin, seven patients presented with suspected kidney lump , Three presented with lump of suspected bowel origin, six patients

presented with suspected retroperitoneal lump, three with suspected pelvis lump, ten patients presented with suspected uterine and tubo ovarian masses, five patients belonged to suspected mesentric origin, three lumps of suspected pancreatic origin and two as parietal lumps.

TABLE - IV

Positivity of ultrasound in various organs is shown in table - IV.

Organ	No. of cases	No. of cases in which ultrasound diagnosis was correct.	No. of patients in which ultra-sound diagnosis was not correct.	Percentage of correct diagnosis
Gall bladder	14	12	2	85.7
Liver	7	6	1	85.0
Kidney	7	6	1	85.0
Uteris and ovaries	10	8	2	80.0
Mesentric	5	4	1	80.0
Pancreas	3	2	1	66.6
Intestinal	3	1	2	33.3
Retro peritoneum	6	5	1	83.0
Pelvis	3	2	1	66.6
Abscess	2	2	-	100.0

Table- IV shows the number of patients whose diagnosis did not tally with final diagnosis and number of patients in whom ultrasound diagnosis tallied with final diagnosis with percentage of success.

Nature of leison wrongly diagnosed by ultrasound (organ wise) is shown in table- V.

TABLE - V

GALL BLADDER :

S.No.	Final Diagnosis	Clinical diagnosis	Ultrasound diagnosis
1.	Chronic cholecystetis with empyema of gall-bladder.	Empyema Gall-bladder	Carcinoma Gall bladder
2.	Carcinoma of gall-bladder.	Mucocoele	Cholcystitis with multile gall-bladder ston with mucocoel

Out of fourteen cases of gall bladder disease two cases were diagnosed wrongly as stated above.

TABLE- VI

LIVER :

Final diagnosis	Clinical diagnosis	Ultrasound diagnosis
Pyogenic liver abscess	Pyogenic liver abscess	Hydated disease of liver

Out of seven cases of liver disease one was diagnosed wrongly as stated above.

TABLE - VII

KIDNEY :

Final diagnosis	Clinical diagnosis	Ultrasound diagnosis
Pyonephrosis right Kidney	Hypernephroma right kidney	Hypernephroma right kidney

Out of seven cases of suspected kidney disease one was diagnosed wrongly as stated above.

TABLE - VIII

UTERUS AND TUBO OVARIAN MASSES :

Final diagnosis	Clinical diagnosis	Ultrasound diagnosis
1. No findings on laprotomy	Small ovarian cyst.	Ovarian cyst
2. Fibrothecoma	Fibroid uterus	Fibroid with degeneration

Out of ten cases of suspected ovarian and uterine disease two were diagnosed wrongly as stated above.

TABLE - IX

MESENTRIC :

Final diagnosis	Clinical diagnosis	Ultrasound diagnosis
Retroperitoneal cyst	Mesentric cyst ? Retroperitoneal cyst ??	Cyst organ of origin ???

Out of five Mesentric masses one was diagnosed wrongly as stated above.

TABLE - X

RETROPERITONEAL :

Final diagnosis	Clinical diagnosis	Ultrasound diagnosis
Pott's spine with iliacus abscess .	Pott's spine with iliacus abscess ?	Cystic abdominal mass. organ of origin unknown.

Out of six retroperitoneal masses one was diagnosed wrongly as stated above.

TABLE - XI

PANCREAS :

Final diagnosis	Clinical diagnosis	Ultrasound diagnosis
Cholecystitis with calculus in CBD and cystic duct.	Obstructive Jaundice with carcinoma head pancreas.	Carcinoma head of pancreas.

Out of three suspected pancreatic disease cases one was diagnosed wrongly as stated above.

TABLE - XII

BOWEL :

Final diagnosis	Clinical diagnosis	Ultrasound diagnosis
- Appendicular abscess extending from left subcostal region to the umblicus.	Hydronephrosis	Pseudo pancreatic cyst ?
- Acute appendicitis with appendicular abscess with intestinal obstruction.	Acute obstruction . (Tuberculosis) ?	Intestinal Obstruction (with intestinal matting.)

Out of the three cases of suspected bowel masses two werediagnosed wrongly as stated above.

TABLE - XIII

PELVIS :

Final diagnosis	Clinical diagnosis	Ultrasound diagnosis
Ruptured ectopic pregnancy with haemetoma collection.	Pelvic abscess	Pelvic abscess

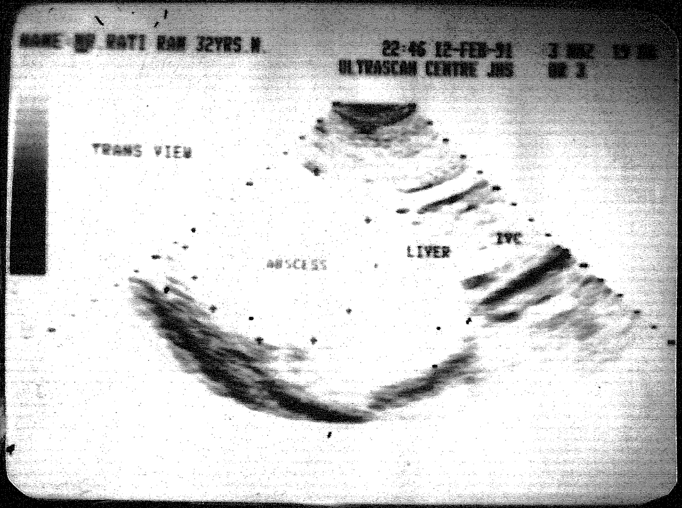
Out of the three suspected pelvic masses one case of ruptured ectopic pregnancy was diagnosed wrongly.

TABLE - XIV

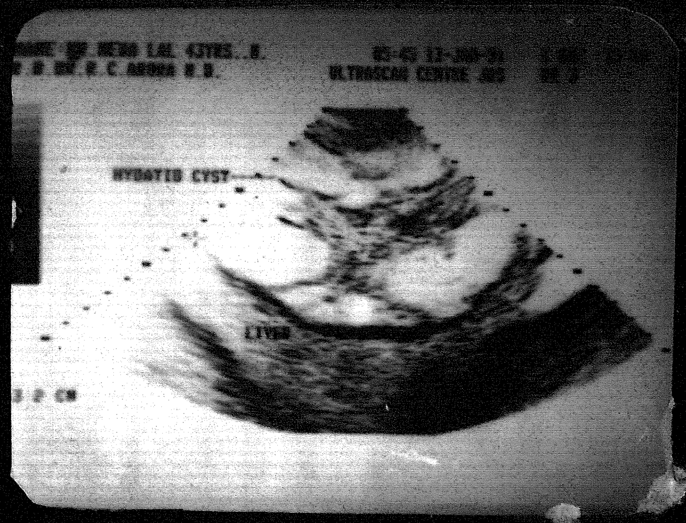
Out of two parietal masses both were diagnosed correctly.

Final diagnosis	Clinical diagnosis	Ultrasound diagnosis
1. Parietal abscess	Splenomagaly	Parietal abscess
2. Iliacus abscess (Cold abscess with pott's spine.)	Cold abscess iliacus with pott's spine.	Cystic mass in right iliac fossa. region. (Iliacus abscess

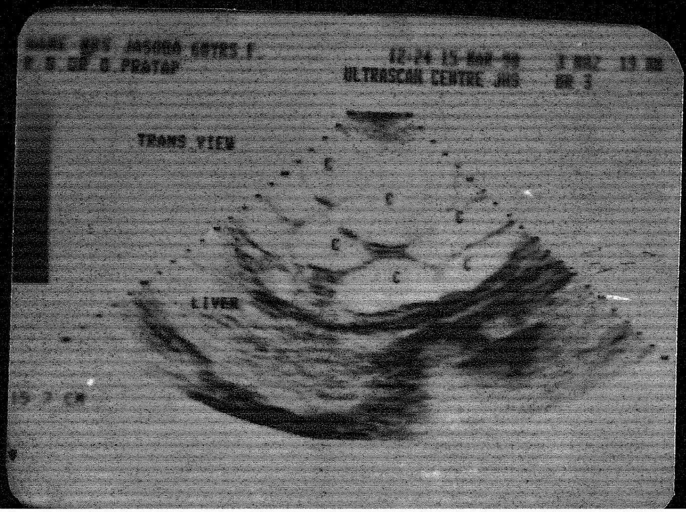
Photograph showing Pyogenic Liver Abscess.



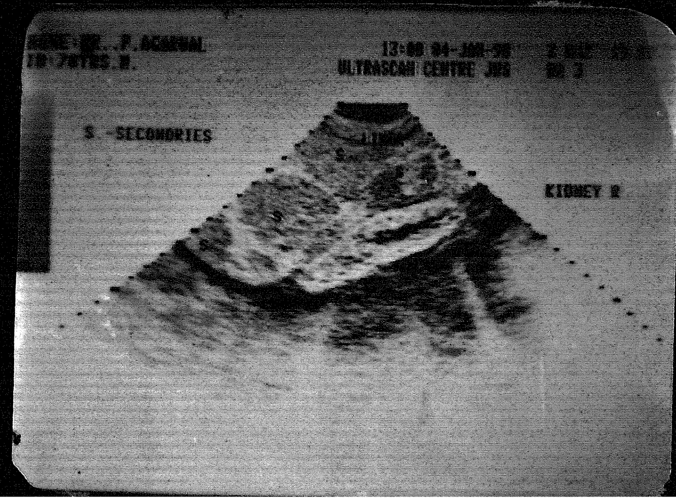
Photograph showing Hydatid cyst of the Liver.



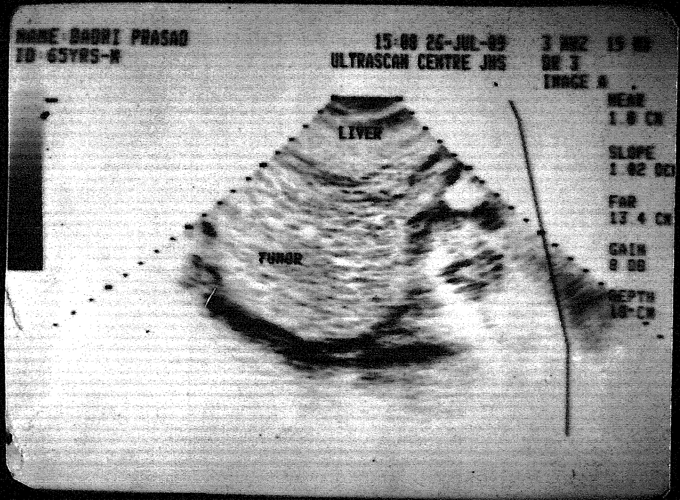
Photograph showing Polycystic Disease of Liver.



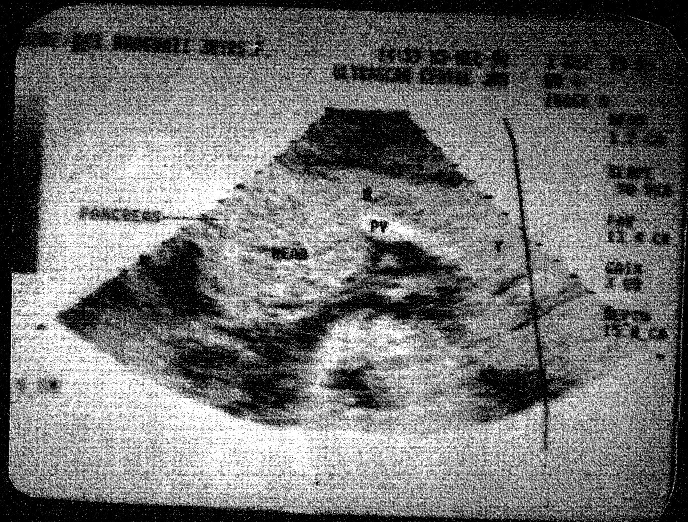
Photograph showing Secondaries In Liver.



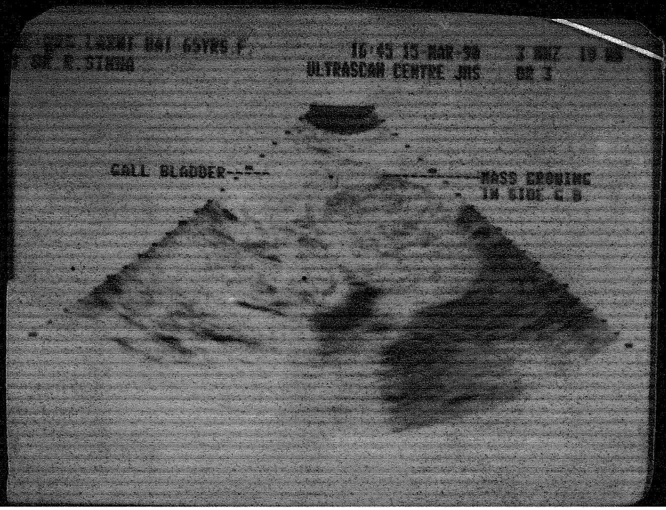
Photograph showing Hepatoma



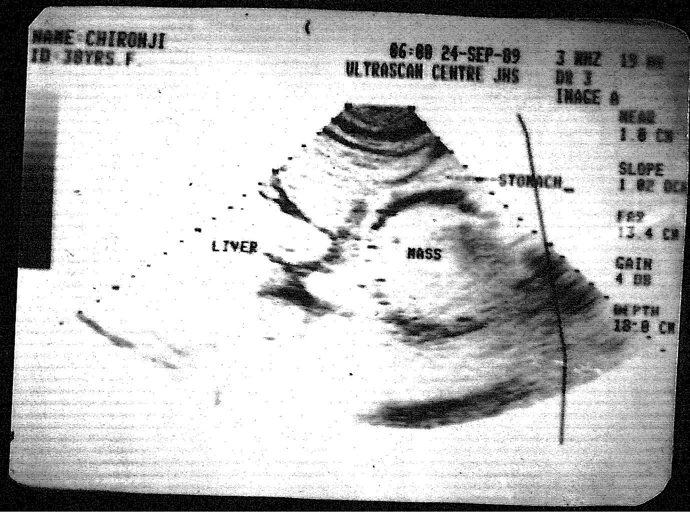
Photograph showing Carcinoma of Head of Pancreas.



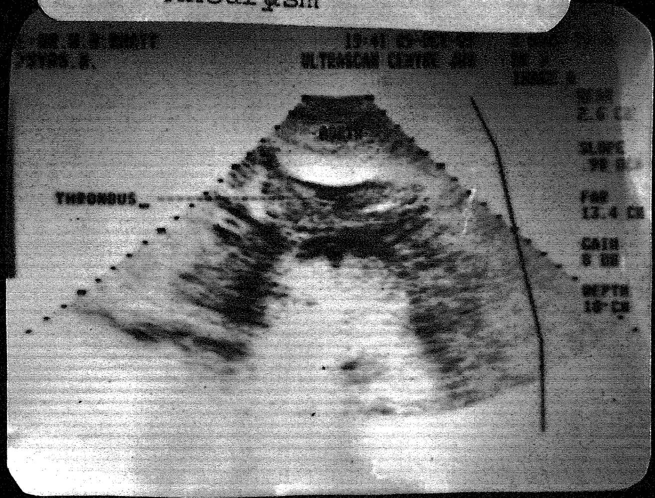
Photograph showing Carcinoma Gall Bladder



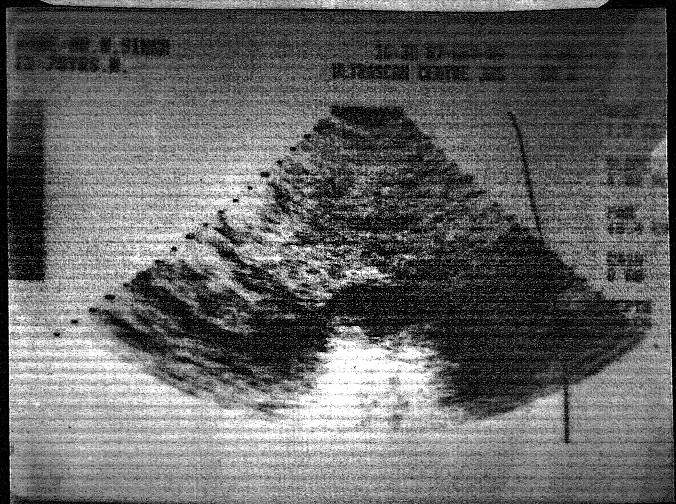
Photograph showing Carcinoma Tail of pancreas



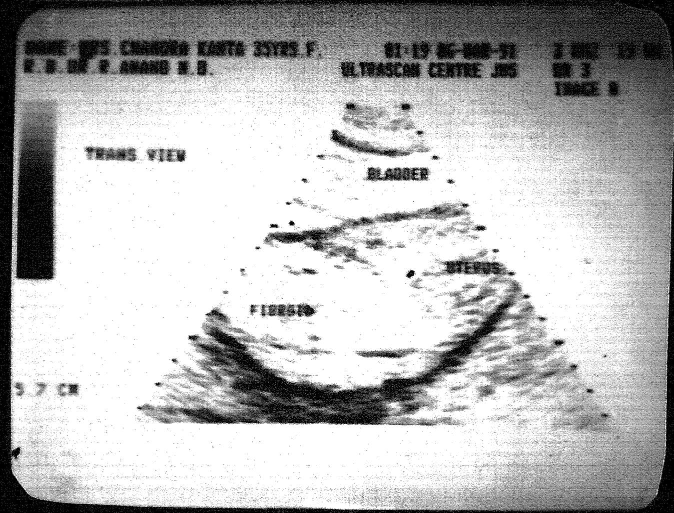
Photograph showing Aortic-Aneurysm



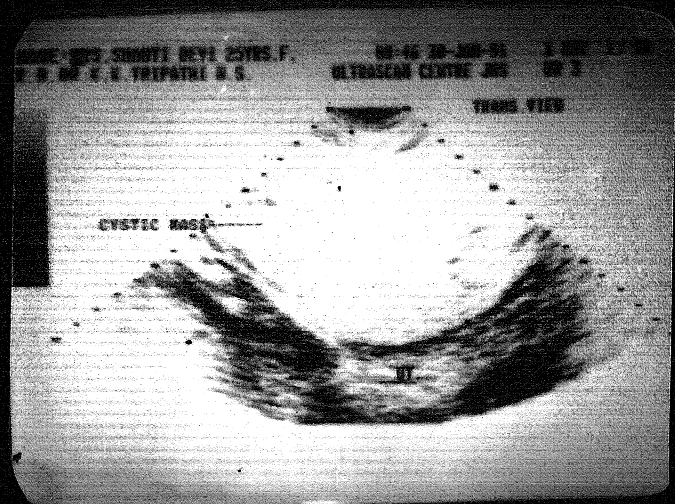
Photograph showing Retroperi-toneal sarcoma.



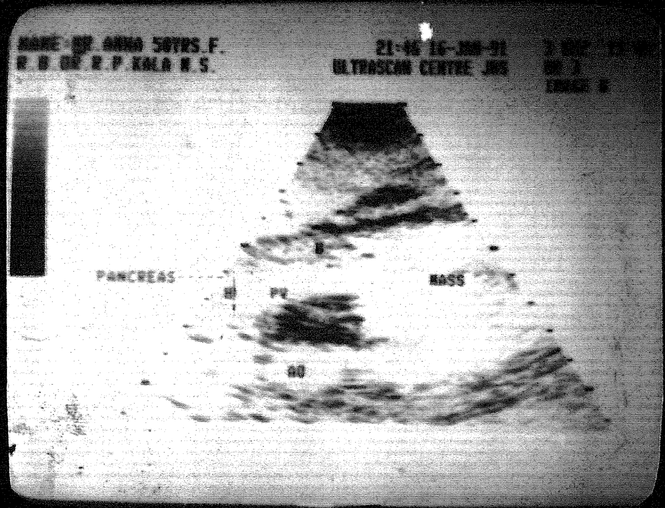
Photograph showing Fibroid Uterus



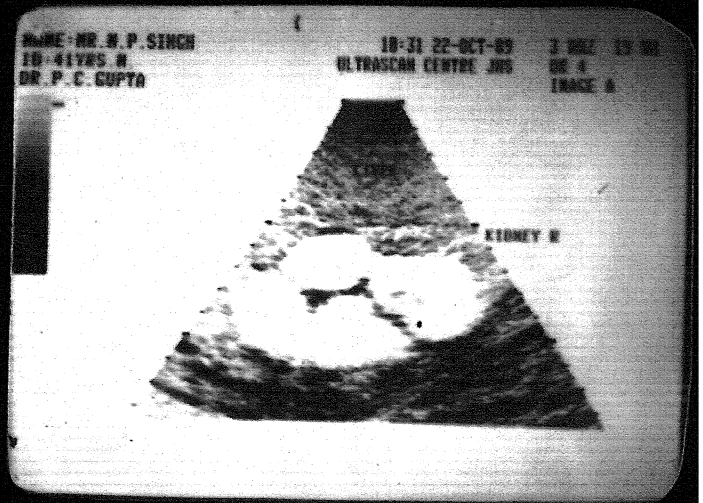
Photograph showing Ovarian cyst.



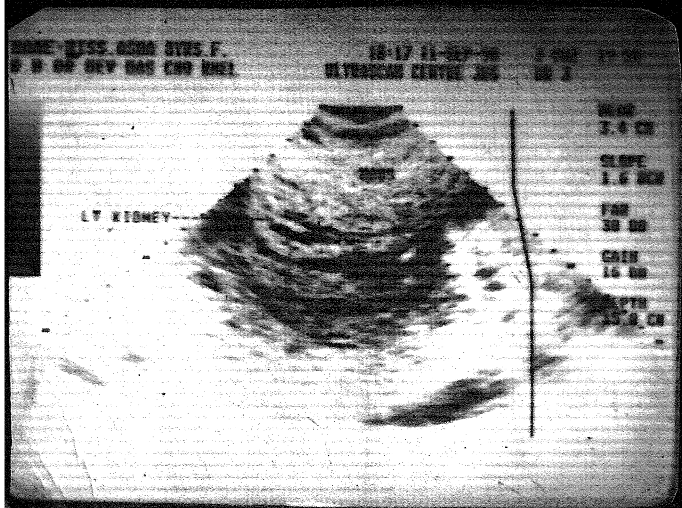
Photograph showing Pseudo-pancreatic cyst.



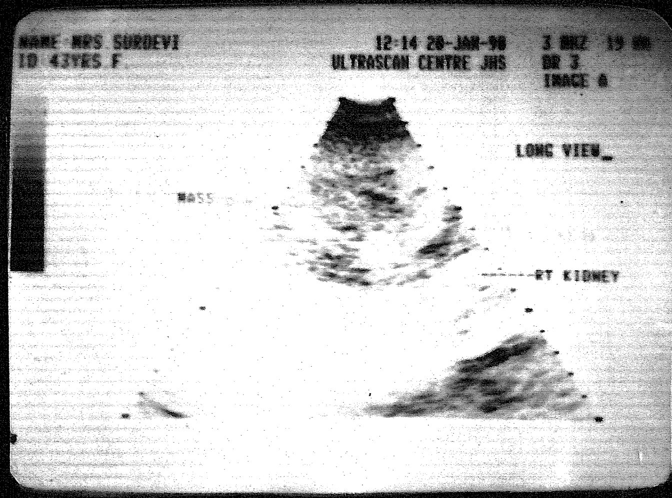
Photograph showing polycystic disease of kidney

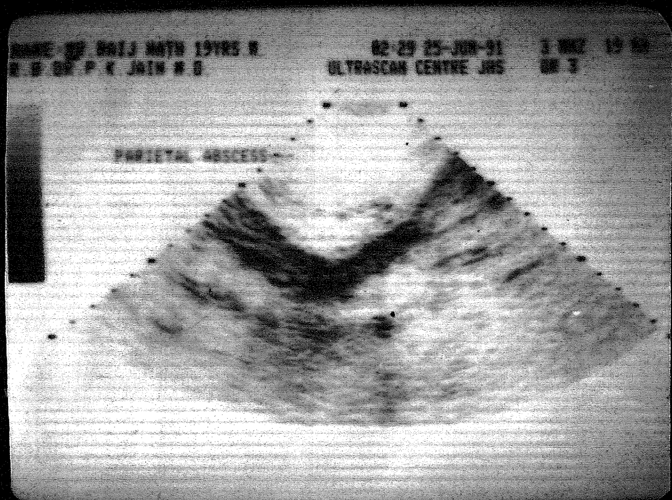


Photograph showing Wilms' Tumour left kidney

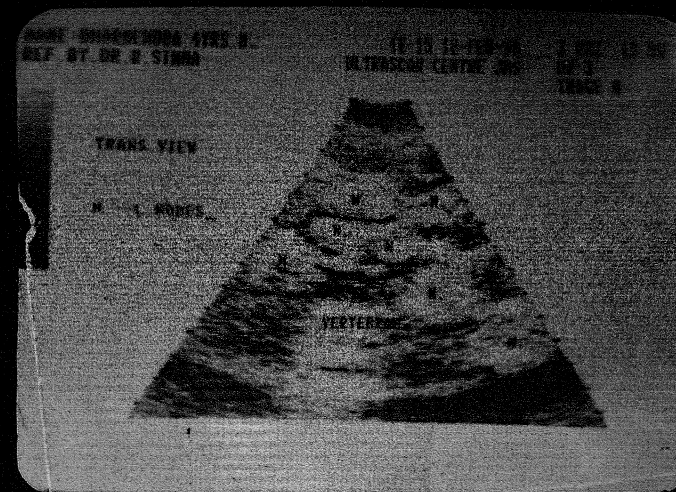


Photograph showing Tumour of TransverseColon.





Photograph showing Parietal-
Abscess



Photograph showing Retroperitoneal
enlarged Lymphnodes.

D I S C U S S I O N

The abdominal surgeon is some times asked to perform an exploratory laparotomy to establish a diagnosis when other diagnostic modalities of lesser magnitude have been unproductive and indecisive. Should the abdominal exploration not allow definitive surgical correction of the clinical problem, then the surgeon faces the uncomfortable prospect of exposing a patient to the customary hazard of general anaesthesia and the potential complications attendant on laparotomy without benefit. Strangely the literature on exploratory laparotomy in recent decade is rather scant Piedrahita and Butter field (1976) evaluated exploratory laparotomy as a diagnostic procedure. They reported an operative mortality of ten percent and a complication rate of twenty two percent. In a similar review in 1970 Scott et al reported 15 percent mortality and 4.3% morbidity.

Any procedure that allows one to see (rather scan) the diseased organ clearly and sharply without a puncture or discomfort to the patient as an out-door procedure is ideal. Laparascopy as a procedure was tried. Mortality and morbidity have been reported to be vary low, almost negligible Anita (1952) and Vilardell (1964) reported mortality of two percent and eleven percent respectively but laparoscopy required local anaesthetization of the part and puncture in the abdominal wall. Though the procedure is safe and complications of general anaesthesia are avoided

but the procedure is not widely accepted for diagnostic purpose at present.

Accurate assement of the exact progression of disease is important for proper planning of therapy and evaluation of effectiveness. Ultrasonography has a large part to play in this role.

Ultrasound techniques is non-invasive technique not requiring either any type of anaesthesia or puncture of any part of the abdomen. In expert hands, a 100 % diagnosis is reached without any mortality.

The use of ultrasound for the diagnosis of abdominal lumps is very frequent and very important in recent times. It is a non-invasive technique. The major value of ultrasound for the surgeon is the ablity to complement and supplement the physical examination to investigate further the nature and anatomical relations of any palpable mass, to establish the precise anatomical relation of the tender areas and to demonstrate obstruction in vessels such as the inferior vena cava, biliary tree or urinary system.

Since ultrasound examination should be regarded as an extension of the physical examination, who-so-ever performs it must identify any palpable mass and ensure that they are scanning the precise area of interest to the surgeon.

Ultrasound examination either indicates the nature of the mass or leads to a much tighter differential diagnosis. It also gives information about the procedure to be done at the time of laparotomy.

In the present study, patients of different age groups ranging from one year to seventy five years were examined thoroughly clinically and a definate clinical diagnosis made and then the patient was subjected to ultrasonography examination of the abdominal lump in question and then patient was subjected to exploratory laparotomy and histopathology to confirm the diagnosis.

In this study patients having abdominal masses were divided into groups depending upon the organ of origin of that particular abdominal mass in order to facilitate over all accurate assessment organ wise. The study group of sixty patients comprised of fourteen gall bladder lump, seven liver masses, seven kidney lumps, ten ovarian and tuboovarian masses, five masses of mesentric origin, three pancreatic masses, three intestinal masses, six retroperitoneal masses, three pelvic masses and two abscesses presenting as large parietal swellings.

The ultrasound diagnosis tallied with final diagnosis in twelve gall bladder cases out of fourteen, six out of the seven liver masses, Six out of seven kidney masses, eight out of ten uterine and ovarian masses, in four out of the five mesentric masses, in two out of three pancreatic masses, in one out of three intestinal masses, in five out of

six retroperitoneal masses and two out of three pelvic masses and two out of two parietal abscesses with an over all accuracy of seventy percent.

In the present study we found ultrasound to be highly accurate in diagnosing the gall bladder diseases, Evaluation of gall bladder and pancreatic duct was helpful in this regard, as dilatation of these structures is a pointer to the presence of low level obstruction (Pedrosa et al, 1981). In determining the presence of the obstructive leison (Benign or malignant), ultrasound was highly sensitive (85%) but very poorly specific. However, since we had only one false negative case and true no negative case, this specificity does not reflect the true picture. We were wrong in diagnosing the nature of one benign and one malignant leisons. The benign leison was missed because the calculi in the gall bladder and common bile duct were mistaken for mass leison. In one patient with carcinoma of gall bladder and multiple stones on posterior surface of common bile duct, we made a wrong diagnosis of gall-stones with cholelithiasis, Diagnosis of the exact origin of the obstructive leison was accurate in fifty percent of the case . However, if pancreatic and periampullary tumours are considered together then the accuracy was 74% . It is perhaps justifiable to consider the tumours together as the approach for further investigative procedures and therapy is similar for both. Further, these two leisons

cannot be confidently distinguished on C.T. scan or even on surgical exploration.

Anderson et al have compared 76 patients ultrasound findings with radiographic, surgical and pathological findings and observed that the ultrasound accuracy is 89% which tallies with our figure of 85% accuracy in all gall bladder pathologies. Confirmed in our series by surgical exploration,. Based on the above findings we conclude that high resolution real-time ultrasonography can compare favourably with C.T. scan in the determination of thepresence and site of obstructive leisons producing jaundice (Khandelwal et al, 1991). and pathologies involving the gall bladder, fallacies may be due to small calcified hydated cysts which mimics, a gall bladder containing calculi if careful scan is not done for gall bladder.

Berk et al, 1981 have stated that ultrasound is particularly well suited in the evaluation of gall bladder, since gall stones can be readily identified in the fluid filled lumen.

Lang et al, (1984) state that ultrasonography is a better choice for pain in right hypochondrium and its diagnostic accuracy is 95%. This has been supported by our observation in the present study in which we could diagnose pancreatic growth, calculi in the kidney, hydated cyst liver and liver masses while doing ultrasound scanning forgall bladder disease.

Ultrasound of biliary system should be used as the primary investigation for gall bladder diseases as ultrasound is non-invasive and less difficult to obtain in an acutely ill patients, poor liver function is not a contraindication. The lack of radiation exposure to both the patients and hospital personal in an additional advantage of sonography. There is no risk of reaction. Further more ultrasound may detect diseases out side the biliary system. However, if gall bladder is full of multiple stones it may not be visualized on ultrasound because of lack of adequate volume of bile within so that the size is below limits of resolution (Thomas et al, 1971).

PANCREAS :

Real-time sonography has greatly enhanced sonographic delineation of the pancreas over that which was possible with static scanning. This is particularly true when water distension of the stomach and duodenum is utilized (Mc Mohan et,al, 1979 ; Fleischer, 1983). The textural abnormalities of the pancreas encountered in pancreatic neoplasms and focal pancreatitis can be depicted by sonography and may not be readily apparent on computed body tomography or magnetic resonance imaging (Taylor et al, 1981). Sonography is helpful in identifying pancreatic pseudocysts these masses are usually in the region of the pancreas by may be present in the pelvic or even the mediastinum. They are usually hypoechoic but can contain internal echoes. They typically enlarge during

their early development and then become stable in size. Rarely, they can erode into a bowel loop and spontaneously decompress (Sarti, 1977). Their appearance is usually more cystic than some of the complex pancreatic tumours, such as cyst adenocarcinoma of the pancreas (Caroll and Sample, 1978). Focal areas of echogenicity may arise from calcification within the pancreas and/or stones within the pancreatic duct (Weinstein et al, 1980 ;Shawker et al, 1984).

Peri-pancreatic lymphadenopathy can simulate the appearance of carcinoma of pancreatic head (Schnur et al, 1982). Gonazlez and Colleagues detected a 52 percent incidence of pseudocyst, in 99 patients with the diagnosis of acute pancreatitis ; 20 percent of these cases appeared to undergo spontaneous resolution nature. Pseudocysts can be documented with accuracy rate exceeding 90 percent, and anatomic relationship with surrounding organs may be readily defind. In our study the diagnosis in pancreatic diseases has been 66.6 percent which is much lower than Gonzalez et al, (1978) but talies with that of Lawson et al, (1979). Kakaria et al (1989) who have reported a success rate of 73% in various pancreatic pathologies. Bhargava et al have stated that ultrasound is cheaper less time consuming can establish diagnosis fairly accuratelly 73.9%. Our lower success rate is attributed to small number of cases in our series and also due to poor preparation of patients.

Most pancreatic masses that become symptomatic are larger than 2 cm and over all accuracies approaching

70 percent have been reported by Mc Carthy et al, (1977) which is the same as that was reported by us (67 percent) but our figure may not be reliable as our study was on a very small group of patients, false positive results are not infrequent and other more invasive techniques such as pancreatic agniorgraphy or endoscopic retrograde pancreatic duct cannulation may be required in some patients (Gonzalez et al, 1971).

Liver :

Real-time sonography has greatly faciliated sonographic examination of liver. Extra hepatic masses can usually be differenciated from intra-hepatic masses based on the displacement of perirenal fat (Gore et al, Graif et al, 1983). In one comparative study of 94 patients by Snow and colleagues (1979) both radionuclide imaging and C T scanning has a sensitivity of approximately 90% in contrast to sensitivity of 75 percent for sonography. However, because of radionuclide liver scanning has equivocal results, further evaluation by C T scanning or ultrasonography may increase diagnostic accuracy. Sullivan et al, (1978) used ultrasonography to evaluate 100 patients with radionuclide scan and by so doing increased the over all diagnostic accuracy from 74 to 93 percent. In our study out of the seven cases only one case of hydatid cyst was misdiagnosed which finally turned out to be a pyogenic liver abscess because chronic abscess may be highly echogenic owing to gas forming organism (Kressel and Filly, 1978 ;

Gosink, 1981 ; Rubinson et al, 1980). In the more chronic abscesses, however, anechoic areas correspond to areas of purrulent material (Newlin et al, 1981). Hydatid abscesses, usually appear as predominantly cyst masses that may contain internal echoes arising from debris so the picture is some what confusing when the pyogenic abscess is multiocular with echogenic foci due to gas. An overal sensitivity of 75% as reported by snow et al (1979) is slightly lower than out sucess in 85 percent of cases. Though the increase is significant but this may be atributed to a good clinical history and examinations and then correlating it with ultrasound finding. Our findings are lower than the findings of Sullivan et al (1978) who reported an over all accuracy of 93 percent using ultrasonography to evaluate 100 patients with equivocal radionuclide scan.

KIDNEYS :

Since about 1965 (Howra et al) there has been increasing interest in B-scan ultrasound examinations of kidney and bladder, Barnett and morley 1971 presented their experience of 40 patients with space occupying leisons of upper urinary tract and 17 patients with bladder tumours.

Mount Ford et al (1971) reviewed the literature and presented their evaluation of the ultrasonic diagnosis in 42 cases of renal leisons. The leisons most readily demonstrated ultrasonically are solitary renal cyst,polycystic kidney, renal tumours,particularly renal cell carcinoma,hydronephrosis and also perinephric abscesses (MountFord et al, 197

Barnet and Morley (1972). In our study we were able to reach the above diagnosis with 85% accuracy which again is higher than what is reported by Mount Ford et al (1971) in a retro-spective study depending solely on ultrasonic information. Our marginal higher accuracy figure may be altributed to the technological advances and modification in the new ultrasound machine with small size and sensitive transducer over the time period and experience gained over the years for proper preparation and positioning of patient and proper correlation of clinical and ultrasound findings.

In our series we made only one in-accurate diagnosis. We diagnosed the case as renal malignancy (Hyper nephroma) but the final diagnosis was pyonephrosis. This was because classically in pyonephrosis, renal pelvics distend and contain low level echoes corresponding to pus but some renal masses have a complex appearance are haemorr-hagic cyst and intrarenal abscesses (Coleman et al, 1980 ; Banner et al , 1981 ; Feldberg and Van Waes, 1982) . Intrarenal abscesses usually appear as complex predomina-ntly cystic intrarenal masses that have an irregular border. If the abscess contains pus, it can appear as completly cystic intra-renal leison. If the abscess has septation within, than it may mimic tumours which are multiocular (Banner et al, 1981 ; Feldberg and Van Waes, 1982). These tumours are large and have several areas of septation within them. Although these tumours are usually benign a few cases of malignant multilo-cular cystic renal cell carcinoma have been reported

(Feldberg and Van waes, 1982). Sonographically, there do not appear to be any features that distinguish benign from malignant multilocular renal masses.

OVARIES AND UTERUS :

An ultrasonic examination is usually employed to confirm the clinical diagnosis of an ovarian mass and to determine its size and consistency. The minimum size of a leison that can be detected by ultrasound is generally around 3 cm. However, Meire et al, reported that cysts of less than 1 cm diameter were detectable ultrasonographically. Although the ultrasound appearances of many ovarian masses do not permit a specific histological diagnosis, there are often identifying feature that may at times suggest a specific diagnosis, over 90% percent accuracy has been reported in diagnosing cystic and solid masses (Fleischer et al, 1978). In our study the over all accuracy was about 80 percent which is lower than the figure reported by Fleischer et al (1978). This is usually due to misdiagnosis because of complex masses. In one of our case we diagnosed a overian cyst but on lapratomy, no cyst was seen. This is accordance with the view of Harbin et al (1980), who found some instances when sonography, computerised tomography or magnetic resonance imaging detectliver, uterine or retroperitoneal masses that are not found at laparatomy (Harbin et al, 1980). In one of the case sonographic diagnosis was a fibroid with degeneration becuase the mass was solid with central an echoic area. The

uterus could not be defined seperate from the mass. But the final diagnosis was fibrothecoma.

In such cases trans vaginal sonography serves as an adjunct to the conventional trans abdominal scanning by determining the region of mass (overian, tublar uterine) and it's internal contents (Mendelson et al 1988 ; Vilar et al, 1987 ; Lande et al,1988 ; Fleischer et al 1988.)

In our cases we diagnosed a case as a pelvic mass but final diagnosis at laparotomy was ruptured ectopic pregnancy. The fallacy is due to the fact that three out of four patients with ectopic pregnancy will present with uterine bleeding and cramping. This condition may not always be considered when one encounters a patients with a complex adnexal mass (Fleisher et al, 1984). Therefore the importance of considering the possibility of an ectopic pregnancy in those patients of child bearing age, who present with a complex adnexal mass and have the clinical and laboratory findings to support the diagnosis of an ectopic pregnancy is emphasized (Fleischer et al, 1984). The sonographic diagnosis was benign ovarian cyst in all the cases which did not confirm with the pathological findings. Few workers have evaluated the role of sonography in differenciating benign from malignant tumours. Morley and Barnett (1970) in a review of 212 patients of pelvic masses suggested that gross malignant change were indicated by thick septa and solid areas. Since the septations in

our cases of benign ovarian cysts were of variable thickness we are in agreement with Requard et al, 1981 that thickness of septa is not usefull in differenciating benign from malignant ovarian tumour.

MESENTRY :

Mesentric cysts are uncommon leisons often misdiagnosed prior to operation.

The mass produced by mesentric cyst is also variable. It may be a asymptomatic mass found on physical examination and may be diagnosed as an ovarian cyst. Splenomegaly, pelvic sarcoma or pancreatic pseudocyst, (Viar et al, 1961). It may be accompained by chronic pain suggesting an ovarian tumour or renal cyst.

Mesentric cysts may be large enough to cause generalized abdominal distension Arnheim et al (1979). The mass may appear acutely Hardin et al (1979) or may rapidly enlarge. Omental cyst although differing little from mesentric cyst except for location should not entrap a loop of bowel,

Cystic intra abdominal masses most likely, arise from the mesentry or embryonic remnants related to gastro intestinal or genitourinary tract. Cystic abdominal masses are most commonly mesentric cysts or gastro intestinal duplication (Kangarloo et al, 1979 ; Wicks et al; 1978 ; Williams and Fisk, 1981) various diagnostic potentials of abdominal ultrasound in pediatric patients have been reported recently.

However role of gray scale sonography in mesentric cysts has not been cited. It's use in our patients supported the differenciation of ascites from a mass and diagnosed it's cystic nature. Correlation of sonography with radiological and clinical findings suggested either a mesentric cyst or small bowel duplication. Therefore abdominal sonography faciliatated the pre-operative evaluation and avoided further interventional procedures like arteriorgraphy (Sanders et al 1975). In our series in one case organ of origin could not be diagnosed becuase of the large size and was diagnosed clinically as abscess, the same mistake was made by Sanders et al (1975). The final diagnosis was retroperitoneal cyst, One of the case was wrongly diagnosed as mesentric cyst but the final diagnosis was retro-peritoneal sarcoma. This is in accordance with the findings of Yeh et al, (1979) that some retroperitoneal sarcomas present sonographically as large masses of heterogenous texture. The irregular sonographic appearance is usually due to rapid degeneration since retroperitoneal sarcoma tend to grow rapidly out growing their blood supply and exhibiting central necrosis. In our series , our diagnosis about the cystic nature of the mass was 100 percent but organ of origin could not be identified in two cases with overall accuracy of 80 percent.

Large retroperitoneal masses may mimic masses that arise within the abdomen (Mayers et al 1976) but in our study we were able to diagnose all cases except in two instances when the organ of origin could not be ascertained and was diagnosed ultrasonographically as abdominal mass (Mesentric) which

concides with the view of Yeh et al (1979), that rapidly growing sarcoma show cystic changes becuase they out grow their blood supply. In another case diagnosed ultrasonographically as cystic mass in right iliac fossa (Ovarian) the final diagnosis turned out to be pott's spine with cold - abscess. This could have been avoided if proper correlation of clinical and ultrasonographic was made as stressed by Sanders et al (1975). In our study our accuracy was 83 percent which is lower than the 90 percent accuracy reported by Edell and Gefter, (1979). This probably can be explained by non-correlation of clinical findings with ultrasonographic findings.

Real-time evaluation of bowel is utilized in water distension techniques of the upper abdomen and pelvis as well as in detecting some leisons that are occult on plain film and contrast radiographic examination (Fleischer et al, 1982 b).

Lutz and Petzold described a special battery of ultrasound findings associated with carcinoma of stomach and colon ; Dev et al, 1990 noted a characteristic pattern of colon carcinoma in series of 25 cases and suggested that it is quite advantageous if ultrasonographic scanning of the colon is undertaken while examining the well-prepared patients for other abdominal organs. In our study, we were able to diagnose one case of carcinoma of colon in the right hepatic flesture of the colon, in accordance with Dev et al, (1990). The diagnosis was achieved as this area was found to be least overlapped by loops of the small bowel and the ultrasonographic appearance of a solid, basically sonolucent mass with a

central linear echo concides with the views of Fleischer et al (1980); Kremmer et al, (1979) and Morgan et al(1980).

In abdominal tuberculosis ultrasound can image hidden areas without resorting to invasive procedures like peritoneoscopy and biopsy which would otherwise be essential, Ultrasonography also permits monitoring response to the treatment, Kapoor et al (1989); Derchi et al (1987) ; Sur et al (1989) but in our only case of illeocaecal tuberculosis we diagnosed it ultrasonologically as illeocaecal lump. But this misdiagnosis could have been avoided if clinical findings were correlated while doing ultrasonography as emphasized by Kapoor et al (1989).

Pearson et al (1988) have used ultrasound for the diagnosis of appendicitis and Chou et al (1987) have diagnosed appendicular abscess by ultrasound. On sonography abscesses range from anechoic to moderataly echogenic, depending on the amount of gas and cellular debris within the abscess (Subramanyam et al, 1983). One should be aware of the predilection of particular areas for abscess localization (Meyer's 1976 ; Bercier et al, 1979).

In one of our case, the appendicular abscess was wrongly diagnosed as a pseudopancreatic cyst becuase it was a huge mass extending from umblicus to left subcostal region and going below the spleen. This was a case of malpositioning of the appendix. In another case, appendicular abscess could not be diagnosed because of matting of bowels all over leading to obstruction and fluid filled bowels. So our success was the lowest in diagnosis of bowel pathologies (about 33 percent). The percentage could be raised further

higher if thorough clinical examination is done and clinical findings are correlated with ultrasound findings, so that the particular area is localized and then one should be aware of the predilection of particular areas of abscess localization (Meyer's 1976 ; Barger et al, 1979) and use other diagnostic modalities as well to reduce the incidence of misdiagnosis and false positives.

Blind liver biopsy, Endoscopic retrograde Pancreatography liver and kidney scintiscanning, selective arteriography and laproscopy are all well established techniques with their values and limitations. Nevertheless, ultrasonography represents a valuable alternative especially when organ of origin and the consistancy whether solid or cystic remains obscure.

Evident from the study is the fact that ultrasonography is of greatdiagnostic value in the various situation mentioned above. This tachnique avoids the use of General anaesthesia, gives us a quick mode of diagnosis, influencing the confidence for subsequent management and avoidance of surgery when it is not indicated especially when the abdominal disease remains obscure and when other diagnostic techniques have failed and it is important to consider or avoid laprotomy and when direct vision of leison and tissue diagnosis becomes mandatory.

To conclude ultrasonography is a usefull diagnostic tool with high rate of accuracy to detect liver, gall bladder, pancreatic , kidney, mesentric and other

abdominal masses, obtain biopsy and assess the operability or inoperability of the case. It avoids unnecessary laparotomies in patients with abdominal masses. The diagnosis of ill defined masses can be easily made, if they are present on the surface of viscera.

So we recommend ultrasonography as routine investigation in all cases of intra-abdominal masses.

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C O N C L U S I O N

The present study was conducted in the Department of Surgery, Maharani Laxmi Bai Medical College, Hospital, Jhansi on a series of sixty patients of either sex and all age groups. In one year period between May' 1990 and June ' 1991.

The aim of the study was to study the Role of ultrasonography in the evaluation of abdominal mass in light of the available literature to minimise the list of direct or indirect investigation under taken to reach a provisional diagnosis, to reduce the investigation cost burden on the patient and administration to minimise the stay at the hospital, so there by decreasing the bed occupancy and making more beds available for the needy patients and to minimiss the inconveincies to patients caused by pre investigation preparations.

Patients presenting with abdominal lumps were examined thoroughly and per-operative clinical diagnosis was made. Then the patients were subjected to ultrasonographic examination and an ultrasound diagnosis made. Then the final diagnosis made during operation and by histopathological examination. Only those patients, who underwent exploration were included in the study. The pre-operative ultrasound diagnosis was compared with the post-operative and histopathological diagnosis.

In our study we included sixty patients of which fourteen presented with gall bladder lump (23%), seven with liver masses (11%), seven with kidney lump (11%), ten with uterine tubo-ovarian masses (16%), three with intestinal masses (5%), six with retroperitoneal masses (10%), five with mesentric masses (8%), three with pancreatic masses (5%), three with pelvic masses (5%) and two as parietal masses of abdomen (3%). Our diagnosis confirmed with the final diagnosis in 85% cases in gall bladder lumps, in 85% of kidney lumps, in 80% of uterine and tubo-ovarian masses, 80% in mesentric masses, 66% in pancreatic masses, 33% in bowel lumps, in 83% of retroperitoneal masses, 100% in parietal abdominal masses and 66% in pelvic masses.

With such high accuracy rate in various organs as has been confirmed in the present study, we recomended ultrasonography for routine abdominal examination in general and abdominal masses in particular as ultrasonography causes the patient no discomfort or distress nor extensive preparation is required prior to examination and because Ionizing radiation is not used, it is particularly valuable in the diagnostic examination of children and pregnant women. It can also be used safely in elderly and very sick patients in whom invasive diagnostic methods are contraindicated with accuracy more than invasive methods. There is no chance of reaction or inconvienience to the patient. It can be very eaisly done as an outdoor procedure with a high rate of accuracy. It does not required hospitalization and so decreases undue stay at the hospital. It can

also be used in the presence of kidney and liver failure with no loss in accuracy or success rate. There is no contraindication to ultrasonography. The part of the anatomy to be imaged generally must be investigated by the shortest and most direct route to the transduder. These factors preclude the use of ultrasound in the presence of open wounds, large metallic sutures and bandages. Further more, ultrasound will not image anatomy with gas, bone or thick adipose tissue interposed between the transducer and structures to be investigated. Ultrasound has withstood the on-salaught of criticism from clinicians and proved it's value in specific areas. Infact there is no question in our mind that ultrasound having passed through fire , has been thoroughly tested and evaluated. It is probably the most cost-effective imaging modality to date, especially in developing country like ours (Mukund, S. Joshi in editorial IJRI, 44 : 1, Feb, 1990). In the words of Dr. Barry Goldberg (1989) " Any body can do ultrasound as long as they have the competence. " However, it is our misfortune that ultrasound is being used by one and all without being adequately understood. To this is added the office practice in ultrasonography being carried out by several gynaecologists who accept relatively cheap machines. Since most of their patients are self reffered and do relatively poor qualities studies. In Dr. Jonathan Rubins words " This is not only deterimental to the patient care, it is also exteremely dterimental to the

cost effectiveness of health care. More than necessary examinations may be carried out due to self referrals.

Ultrasonography is a simple procedures with added safety rendering more hazardous and invasive investigations superflous. It abbreviates the hospital stay of the patient. Thus adding to the economy of the patient and the administration, without compromising with diagnostic accuracy of ultrasonography.

In conclusion, ultrasonography for abdominal masses is a safe simple, cost effective method of diagnosis rendering more hazardous and invasive investigations superfluous. It can be done in all types of patients with no absolute contra indication as an out patients procedure without any inconvenience to the patients and without general or local anaesthesia with absolutely no mortality or morbidity. So because of the ease and very high accuracy rate as is evident from the above study, we recommend ultrasonography to be used routinelly in evaluation of abdominal masses.

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BIBLIOGRAPHY

1. Adam E.J. Creach Barky M. and Joseph, A.E.A. : Total abdominal scanning of 650 patients : Rate of visualization and pathology. Presented at the 16th Annual British Medical ultrasound society scientific meeting.

2. Anderson J.C., Harmid R.K. : Gray scale ultrasonography of the gall bladder. An evaluation of accuracy and a report of additional ultrasound signs. AJR ; 129 ; 975-977 , 1977.

3. Arheim. E., Schneck H., Normal A., et al : Mesentric cyst in infancy&childhood. Review of literature and report of a case. Paediatrics 24 ; 469-476 , 1959.

4. Bartum, R.J., Crow, H.C. and Foote S.R. : Ultrasonic and Radiographic cholecystography, N. Engl. J. Med : 296 : 538, 1977.

5. Behan M., Kalam E. : The echographic characteristics of fatty tissues and tumors Radiology, 129 : 143, 1978.

6. Benardino M., Thomas J., Maves G. : A initial experience with post-data processing in hepatic sonography. Am. J. Roentgenol, 136 : 521, 1981.

7. Blei C., Hartman D., Friedman A : Papillary renal cell carcinoma , ultrasonic , pathologic correlation. J. Clin. Ultra : 10 : 429, 1983.

8. Boverman R., Silver T., Jaffe M. : Real-time ultrasound diagnosis of intussusception in children, Radiology, 143 : 527 , 1982.

9. Boverman R, Silver T., Jaffe M. et al : Sonography of adrenal masses Roentgenol. 137 : 1227 , 1981.

10. Bradley W., Brown T., Jacobs R. : Mobile mesentric andenopathy : Sonographic distinction from pancreatic mass. Am. J. Roentgenol, 135 : 849, 1980.

11. Carroll B., Moskowitz P. : Sonographic diagnosis of neonatal meconium cyst. Am. J. Roentgenol. 737 : 1262, 1981.

12. Carroll B., Sample W.; Pancreatic cystadecarcinoma : C T body scan and gray scale ultrasound appearance. Am.J. Roentgenol. 131 : 339 , 1978.

13. Carroll B., Silver man, P., Goodwin P. et al:Ultrasonography and indium -III blood cell scanning for the detection of intra-abdominal abscesses. Radiology ;140: 155 , 1981.

14. Carroll B., Ta H. : Ultrasonographic appearance of extra-nodal abdominal lymphoma, Radiology, 136 : 419 , 1980.

15. Charboneair J. Hattery R., Ernste et al : Spectrum of sonographic findings in 125 renal masses other than being simple cyst. Am. J. Roentgenol., 140 : 87, 1983.

16. Chopra A., et al : Hydenoephrosis in children : narrowing the differential diagnosis with ultrasound : J. Clin. Ultrasound, : 8 : 473, 1980.

17. Cochrane W.J., Thomas, W.A. (1972) : The use of ultrasound B-mode scanning in localization of I.U.C.D. Radiology : 104 : 623 - 627, 1972.

18. Cochrane W.J., Thomas W.A. : Ultrasound diagnosis of gynaecologic pelvic masses : Radiology , 110 : 649-654, 1974.

19. Coleman B., Arger P., Hulherm Ec. : Pyonephrosis : sonography in the diagnosis and management. Am. J. Roentgenol : 137 : 939 , 1981.

20. Coleman B., Arger P., Mulhern Ec et al : Gray scale sonographic spectrum of hypernephroma, Radiology : 137 : 757, 1981.

21. Conrad M. David G., Green C., et al : Real-time ultrasound in diagnosis of acute dissecting aneuryim of the abdominal aorta Am. J. Roentgenol., 132 : 115 , 1979.

22. Dalla Palma L, Rizzatto G. ; Pazzi-Mucelli R.S., Bazzocchim : Gray scale ultrasonography in the evaluation of carcinoma of gall bladder. Br. J. Radiol. 53 : 662 - 667, 1980

23. Fleischer A., Parker P., Kirchner S. : Sonographic findings of pancreatitis in children . Radiol. , 146 : 151, 1983.

24. Fleischer A., Born M., Kirchner S. et al : Complementary use of Tc HIDA and upper abdominal sonography in diagnosis of a choledochal cyst : a case report. South Med. J. 73 : 1651 , 1980.

25. Fleischer A., Muhletaler C., James A. : Detection of bowel leisons during abdominal and pelvic sonography, J.A.M.A. , 244 : 1096 , 1980 b.

26. Fleischer A., James A.E., Millis J.B., Julians C. : Differential diagnosis of pelvic masses by gray scale sonography, A.J.R. , 131 : 469-476 , 1978.

27. Franken E., Yin-Chilu U., Smith W.; Nephroblasto matosis : clinico pathologic significance and imaging characteristic ; a case report . Am. J. Roentgenol. 138 : 950,1982.

28. Freeney P., Weinstein C., Tagt D., et al : Cystic Neoplasma of the pancreas : new angiographic and ultra-sonographic findings.

29. Ford J. : Mesentric cyst review of the literature with report of an unusual case. Am. J. Surg. 99 : 878-884, 1960.

30. Gonzalez, A.C. , Bradley, E.L., and Clements, J.L. Jr., : Pseudocyst formation in acute pancreatitis, Ultrasonographic evaluation of 99 cases, Am. J. Roentgenol., 127 : 315, 1976.

31. Gosink B., Lemon S., Scheible W. et al : Accuracy of ultrasonography in diagnosis of hepatocellular disease, 1981.

32. Grinder R., Wolverson M., Jagannadheram B. et al : Congenital mesoblastic nephroma with cystic component J. Clin, ultrasound ; 9 : 43 , 1981.

33. Harcke H., Williams J., Popky G. : Abdominal masses in the neonate , a multiple modality approach to diagnosis. Radiographic , 2 : 69, 1982.

34. Hartman D., Sanders R.; Wilms tumor versus neuroblastoma usefulness of ultrasound differenciation, J. ultrasound Med., 1 : 117, 1982.

35. Hardin W., Ellcot R., Wesson R., et al : Haemorrhagic Mesentric cyst simulating an acute abdomen. Am. Surg. 33 : 733-736 , 1967.

36. Harbin W., Wittenberg J., Freeucci J.Jr. : Fallibility of exploratory laparotomy in detection of hepatic ovarian and retroperitoneal masses. Am. J. Roentgenol. ; 135 : 115, 1980.

37. Hess C.F. et al : Reproducibility of the sonographic determination of the size of intra-abdominal space occupying lesions. ROFO : 149 (2) : 184-8 (EVG-ABC-GER); Aug., 1988.

38. Hidalgo, H., Dunnick, N., Rosenberg,E. et al : Parapelvic cyst appearance on CT and sonography. Am. J. Reentgenol., 138 : 667, 1982 .

39. Jaffe M. White S., Silver. T. et al : Wilms tumor : Ultrasonic features, pathologic correlation and diagnostic pitfalls.Radiology, 140 : 147, 1981.

40. Kakaria K. Vashist S., TandonR., Bhargava S., : Pancreato-biliary discorder comparative evaluation by ultrasound and E.R.C.P. Radiol, 43 (2) : May, 1989.

41. Kamin P., Bernardio M., Green B. : Ultrasound manifestations of hepatocellular carcinoma. Radiology , 131 : 459, 1979.

42. Kangarloo H., Sarti D., Sample W., Amundson G. : Ultrasonographic spectrum of choledochal cyst in children. Pediatr. Radiol; 9 : 15, 1980.

43. Kapoor V.K. and Sharma L.K. : Abdominal tuberculosis. Brit. J. Surg. 75 ; 2-3 , 1989.

44. Kaude J., Felman A., Hawkine I. : Ultrasonography in primary hepatic tumors in early childhood. Pediatr. Radiol. 9 : 77 , 1980.

45. Knochel J., Kochler P., LeeT., et al : Diagnosis of abdominal abscess with computed tomography, Ultrasound and I- III leucocyte scane, Radiology, 137 : 425, 1980.

46. Kressel H., Filly R. :Ultrasonic appearance of gas containing abscess in the abdomen. Am. J. Roentgenol. 130 : 129, 1980.

47. Laing F.C., Dalsem V.F., Marks W.M., Barton J.L. : Dermoid cysts of the ovary their ultrasonographic appearance, Obst. & Gynal ; 57 : 99-104, 1981.

48. Laing F.C. : Diagnostic evaluation of patients with suspected cholecystitis ; Surg. clin. North, Am. 64(1) : 3 - 33, 1984.

49. Lambers J.K. and Connon J.J. : E.R.C.P. and billiary obstruction, Lancet, 80 (1) : 152-153. Jan 1981

50. Lawson T.L., Irani S.K. and Stock M. : Detecting of pancreatic pathology ultrasound and E.R.C.P. Gastro-intest. Radiol, 3 : 335-341, 1979.

51. Leopold G.R. : Grary scale ultrasonography of upper abdomen. Radiol. 107 : 665-671 , 1975 b.

52. Lutz H.T., Petzold T.R. : Ultrasonic diagnosis pattern of space occupying lesions of the stomach and intestine. J. Ultrasound Med. Biol. 2 : 129- 132.

53. Mc Carthy, C.F., Wells, PNT, Ross, F.G.M. and Read A.E.A. 1969.The use of ultrasound in the diagnosis of cystic leison of the liver and upper abdomen and in detection of AscitesGut. 10 : 904-912.

54. Madewell J. , Goldman S., Davis C.,Jr. et al : Multi-locular cysts nephroma : a radiographic pathologic correlation of 58 patients. Radiol. 146 : 309, 1983.

55. Meire H.B., Farrant P., Guha T., : Distinction of benign from malignant ovarian cyst by ultrasound . Br. J. Obst. & Gynae, 85 : 893-899, 1978.

56. Miller J., Hindman B., Lam H. : Ultrasound in evaluation of small bowel lymphoma in children, Radiology, 135 :409, 1980.

57. Miller J. , Hindman B., Lam H. : Ultrasound in the evaluation of small bowel lymphoma in children. Radiology, 135 : 129, 1980.

58. Miller J.; The ultrasonographic appearance of cystic hepatoblastoma. Radiology ; 138; 141 , 1981.

59. Morgan C., Trough W., Oddom T., et al : Ultrasonographic patterns of disorders effecting the gastrointestinal tract. Radiology : 135 ; 129 , 1980.

60. Morley P., Barnett E.; The use of ultrasound in the diagnosis of pelvic masses. Br. J. Radiol, 43 : 602-616, 1970.

61. Mount Ford. R.A., Ross F.G.M., Burwood R.J. and Knapp M.S.: The use of ultrasound in the diagnosis of renal disease Br. J. Radiol. 44 : 860-869, 1971.

62. Mueller P., Ferrucci J., Harbin U. et al : Appearance of lymphomatous involvement of the mesentry by ultrasonography and body computed tomography : The " Sandwich Sign." Radiology ; 134 : 467, 1980.

63. Nardeli G.B. et al : Ultrasound evaluation in follow up of ovarian cancer. Clin Exp. Obst. & Gynae., 14 (3-4) : 174-8, 1987.

64. Neff C. , Simeone J., Witternberg J. et al : Inflamatory pancreatic masses : problem in differenciating focal pancreatitis from carcinoma, Radiology ; 150 : 35, 1984.

65. Niron E., Ozer H. : Ultrasound appearance of liver hydatid disease. Br. J. Radiol ; 54 : 335, 1981.

66. Ostrum B.J., Goldberg B.B. & Isard H.J. : A mode ultrasound differenciation of soft tissue masses Radiology, 88 : 745-749 , 1967.

67. Peakka L.A.T., Mattsan J., Kovisto E., Lehtinow E. : The accuracy and value of abdominal ultrasonography VI, European congress of Radiology, Abstract, book, 193 , 1987.

68. Pearson R.H. : Ultrasonography for diagnosis of appendicits. Br. Med. J. (Clin. Res.) 297 (6 & 44) ; 309-310, (16 R.E.F.), July 30, 1986.

69. Phillips H. , Cox K., Reid M. et al : Pancreatic sonography in cystic fibrosis . Am. J. Roentgenol. 137 : 69, 1981.

70. Pollack H., Banner M., Arger P. et al : The accuracy of gray scale renal ultrasonography in differenciating cystic neoplasm from benign cysts. Radiology ; 143 : 741, 1982.

71. Raghvendra B.N. : Ultrasonographic features of primary carcinoma of gall bladder- reported 5 cases . Gastrointestinal. Radiol. 5 : 239 - 244, 1980.

72. Requard C.K., Mettler F.A., Wicks J.D. : Pre-operative sonography of malignant ovarain neoplasms. A.J.R. , 137 : 79-82, 1981.

73. Roemer C., Ferruci J., Muellar P. et al : Hepatic cyst diagnosis and therapy by sonographic needle aspiration. Am. J. Roentgenol, 136 : 1065, 1981.

74. Rubinson H., Isikoff M., Hill M. : Diagnostic imaging of hepatic bascess : a retrospective analysis. Am.J. Roentgenol. 135 : 735 , 1980.

75. Sandler M.A., Silver T.M., Karo J.J. : Gray scale ultrasonic features of ovarian teratomas, Radiology, 131 : 705-709, 1979.

76. Sarti D. : Rapid development and spontaneous regression of pancreatic pseudocystis documented by ultrasound : Radiology , 125 : 789 , 1977.

77. Schnor M., Hoffman J., Koenigsberg, M. : Gray scale ultrasonic demonstration of peripancreatic adenopathy. J. ultrasound Med., 1 : 139, 1982.

78. Snow J.H., Goldstein H.M. and Wallace S. : Comparision of scintigraphy, sonography and computed tomography in the evaluation of hepatic neoplsm. Am. J. Roentgenol ; 132 : 915 , 1979.

79. Sorensen K., and Hash E. : ultrasonic diagnosis in patients refered from general practice. U. GE SK , RIFT FOZ LAEGER , 147 : 121-127 , 1985.

80. Subramanyam B., Raghvendra N., Madamda M. : Renal transitional Cell carcinoma : sonographic and pathological correlation, J. Clin. Ultrasound , 10 : 203, 1982.

81. Subramanyam B. , Raghvendra N., Bosniak M. et al : sonography of pyonephrosis : a prespective study , Am. J. Roentgenol, 140 : 991 , 1983.

82. Sullivan, D.C. , Taylor K.J.W. and Gott-Schalk A. : The use of ultrasound to enhance the diagnostic utility of equivocal liver scintigraphy, Radiology , 128 : 727, 1978.

83. Sur C.D.R. , Sangameswaran K., Chaturvedi A.K., et al : Ultrasound in abdominal tuberculosis, Radiology,43, 1 , Feb , 1989.

84. Tanaka S., Kitamura T., Imaoka S. et al : Hepatocellular carcinoma ; sonographic and histologic correlation, Am. J. Roentgenol. 140 : 701 , 1983.

85. Venkateshwarlu J. et al : Sonographic evaluation of stomach, small intestine and colon : Ind J. Rad. 43 : 379-387 , 1989.

86. Walsh J.W. , Taylor K.J.W. , Wasson J.F. et al : Gray scale ultrasound in 204 proved gynaecological masses : Accuracy in specific diagnostic criteria. Radiology : 130 : 391-397 , 1979.

87. Whalen J. : Radiology of the abdomen : Impact of new imaging methods, Am. J. Roentgenol , 133 : 585 , 1979.

88. White S., Stuck K. , Blane C. : Sonography of neuroblastoma. Am. J. Roentgenol. 141 : 465 , 1983.

89. Wicks J., Silver T., Brec R. : Glaint cystic abdominal masses in children and adolescents : ultrasonic differential diagnosis. Am. J. Roentgenol ; 130 : 853 ,1978.

90. Willi U., Reddish J., Teele R. : Cystic fibrosis its characteristic appearance on abdominal sonography A.J.R. , 134 : 1005 , 1980.

91. Woodwar B. , Pond J.B. and Warwick R. : How safe is diagnostic soner. Brit. J. Radiol. 43 : 719, 1970.

92. Viar W., Scott W., Donald J., : Mesentric cavernomatous lymphangiomata ; brief review and report of two cases ; Ann . Surg. 153 ; 157 - 160 ; 1961.

93. Yeh H., Rabinowitz J. Ultrasonography and computed tomography of gastric wall leisons, Radiology, 141:147,1981

94. Yeh H., Mitty H. , Rose J., et al : Ultrasonography of adrenal masses usual features. Radiology , 127 : 467, 1978 a .

95. Yeh H., Mitty H., Rose J. et al : Ultrasonography of adrenal masses : unusual manifestations. Radiology, 127 : 475 , 1978 b.

96. Yeh H. : Ultrasonography and computed tomography of carcinoma of gall bladder : Radiology , 133 : 167, 1979.

97. Yoder I., Pfister R., Lindfors K. et al : Pyonephrosis : Imaging and intervention . Am. J. Roentgenol, 141 : 735, 1981.

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